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CONTENTS.

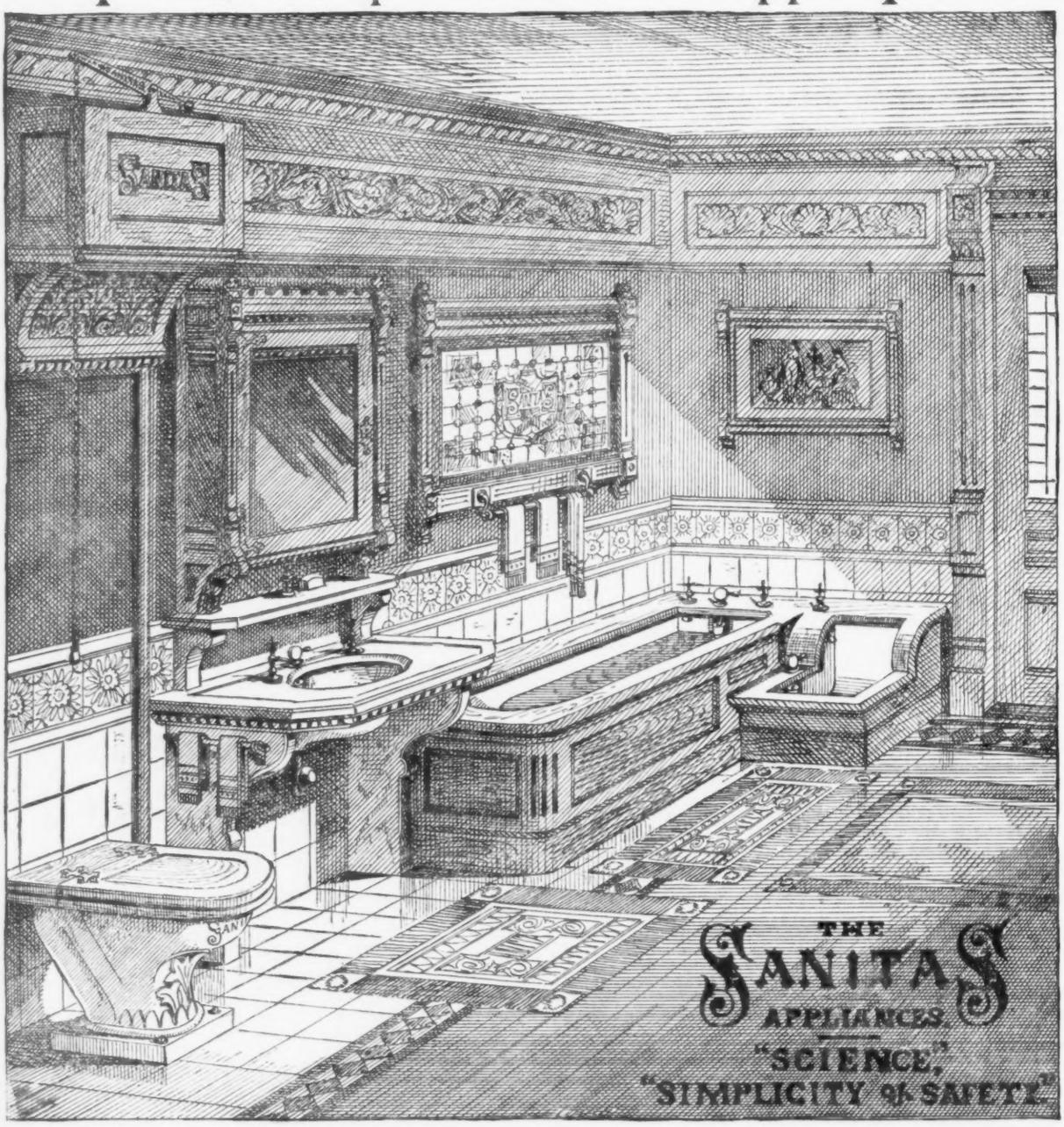
Editorial Summary.
Water-Supply of Buildings. — VI.
Paris Gossip.
Building Materials. — III.
Books and Papers.
Communications.
Notes and Clippings.
Trade Surveys.

ILLUSTRATIONS.

The Channing Unitarian Church, Newton, Mass.
(Gelatine Print issued only with Imperial Edition.)
Competitive Design for the City-hall, Cincinnati, Ohio.
House at Tuxedo Park, N. Y.
Sketch for House on Park Ave., N. Y.
Doorway of the Church at Harfleur, France.

VIEW OF BATH-ROOM FITTED UP WITH THE

SANITAS PLUMBING APPLIANCES



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CONTENTS.

SUMMARY: —
The Programme for the Indiana Soldiers' and Sailors' Monument Competition. — European Codes governing Competitions and American Practices.— The Hydrographic Office investigates the Effect of Oil on Waves.—The Area Controlled by a small Quantity of Oil. — A French Admiral Reports on the same Subject. — Causes which led to the Growth of the Temples of Luxor and Karnak. 117
THE WATER-SUPPLY OF BUILDINGS. — VI. 119
PARIS GOSSIP. 121
THE ILLUSTRATIONS: —
The Channing Unitarian Church, Newton, Mass. — Competitive Design for the City-hall, Cincinnati, O.— House for Pierre Lorillard, Esq., Tuxedo Park, N. Y. — Sketch for House, New York, N. Y.— Doorway of the Church at Harfleur, France. 123
BUILDING MATERIALS.— III. 123
BOOKS AND PAPERS. 126
COMMUNICATIONS: —
The French and Houdon's "Washington." — Cement-Stucco Work. 127
NOTES AND CLIPPINGS. 127
TRADE SURVEYS. 128

WE are very glad to see that the Commissioners for the Soldiers' and Sailors' Monument for the State of Indiana have exercised the discretion entrusted to them in such a way as to transform the rather forbidding scheme of competition foreshadowed in the preliminary circular into a programme which, if not all that we could desire, is one of the best and fairest ever published in this country, and, if carried out in the spirit which has so far characterized the proceedings of the Commission, ought to secure for the State a design of unusual merit. The two cardinal points of satisfactory competition, the submission of the designs to expert judgment, and the employment of the author of the best design to carry it into execution, have been provided for, under reservation, by the stipulation that the Board of Experts, consisting of Professor Ware of Columbia College, New York, Professor Campbell of Wabash College, Indiana, and General Morris, one of the State House Commissioners of Indiana, shall draw up a report on the designs, with comments and recommendations, and shall assist the Commissioners in their deliberations; the Commissioners promising, on their side, that they will appoint the author of the design placed first supervising architect or sculptor to carry it out, "if, in their judgment, they are warranted in doing so," and that in any case they will adopt no design, and make no appointment, which may be condemned by the Board of Experts. It is so rare a thing in this country for a board of commissioners, however unskilled in any art, to delegate their power of selection entirely to experts that the terms proposed are perhaps as favorable in this respect as could have been expected; and, if carried out in good faith, as we cannot doubt that they will be, we do not see that an honorable architect need hesitate to accept them. The compensation promised to the supervising architect is a commission of five per cent on the total cost of the work, including all sculpture and other decoration, and the embellishment of the grounds. The work required of competitors is made as light as possible, nothing but sketches, on half-imperial sheets of paper, being either required or admitted, and the rendering of these is to be very simple. Ten of the best known architects in the country have been invited to compete, and are to be paid two hundred dollars apiece for their trouble; but designs from architects and sculptors not specially invited will be received and considered.

THE Swiss architects have recently drawn up a set of principles for public competition, which, without being copied from the English, French, Belgian or German codes, agrees with them in all important particulars. The most important, as the committee which drew up the English rules well pointed out, are the two stipulations, that the competing sketches shall be judged by experts; and that the author of the plan placed first shall be commissioned, at the usual remuneration, to carry out his design; and these occupy a prominent place in the Swiss code, modified, however, by the provision that in cases where strong reasons oppose the appointment of the author of the best design, the winner of the second premium may be substituted for him as architect of the executed work. In regard to the reservation, so often made, permitting the promoters of the competition to reject all the designs, under cover of which such outrageous frauds are often practised on architects, the Swiss code says plainly that no "backing out" from a competition, to translate its expression literally, is ever to be permitted. No matter whether the plans submitted are good or bad, the premiums offered must be awarded and paid, to the best if any are good, to the least objectionable if all are bad. This principle, which is contained in several other codes, ought to be more insisted upon than it has been. The most shameful instance of its violation that we remember was in the competition for historical painting held in Philadelphia some years ago, where the judges, after placing the work of a certain artist first, refused to pay him the premium which had been advertised, on the ground that his picture was not, in their opinion, worthy of it; but every one knows of numberless similar cases, and it is quite time for the profession to express its opinion clearly on the matter. It is obvious that if the prize of a competition may be withheld at the pleasure of the judges, a competitor who wishes to succeed must not only send in the best design, but must gain some hold of interest or friendship on the judges, to make sure of not being thrown over entirely after all his pains. It may be taken for granted that the judges will always be disappointed in the result of a competition. In the great majority of cases their disappointment is the result of their own carelessness, ignorance or want of clearness in specifying in the programme just what they wished to have, and what they were willing to leave to the discretion of the designer; but even where they are not at fault in this way, the realization of a scheme always falls short of one's anticipations, and expert judges, even more than laymen, are sure to find points to criticise in the best of the competing plans. Under these circumstances it is natural for imaginative persons to think that the perfect plan, which they are sure awaits them if they could only find the means for discovering it, might be secured by a second effort, in which the mistakes of the first should be avoided; and the temptation to save the prize-money and gain an opportunity for using it in a second venture, by rejecting all the first designs, is too strong for most persons, unacquainted with professional feelings and ethics, to resist. Of course, the knowledge that they are liable to suffer this treatment keeps the best architects out of competitions, just as the Philadelphia farce brought ridicule upon American historical painting, and a contempt upon American juries of fine art, which will not die out for a generation, and it is for the public interest that such matters should be better regulated. There would be few entries for horse-races in which the animals that came in first, after running fairly, were liable to have their prizes denied them because they did not fulfil the judge's expectations; and the same rule applies to more dignified contests. There is no emulation in the effort to please the whim or the fancy of a person in authority, and nothing but meanness and corruption is fostered by the attempt. If we wish to develop the powers of our artists, or avail ourselves of their most strenuous efforts, by matching them against each other, some one must be victor in every contest; and if, as the Swiss architects propose should be done in their competitions, the judges send to every competitor a statement of the reasons for their choice, the vanquished may gain as much good as the victors from the struggle, while the public will profit perhaps most of all.

THE science of calming waves by means of oil is at present being pushed very rapidly to effective results, and, judging from what has already been accomplished, it will not be many years before every sailing-vessel, at least, will carry cans of oil as an indispensable part of its outfit. For yachts and small boats, particularly, the use of oil appears to be of the greatest value. Such craft have, as a rule, little to fear from a lee shore, but are liable to be swamped in a heavy sea by the curling over of a breaking wave upon them, and it is just this which oil effectually prevents. It is a pleasure to find that the Hydrographic Office at Washington, which has bravely kept up the theory of the existence of an American merchant marine, and continues to pursue its investigations with as much zeal as in the days when it helped so efficiently to make American ships and American sailors the best in the world, has taken up

this important subject, and collected a fund of information about it which is being eagerly utilized by maritime nations. Strange to say, the use of oil for stilling dangerous breakers was for many years strictly prohibited by law among these very nations, on the theory that waves temporarily repressed in that way would return afterward with redoubled fury, and it seems to have been reserved for the United States officers to point out clearly the absurdity of this landsman's notion, and, by explaining the true effect of the oil, prepare the way for the abolition of the old Admiralty regulations in regard to the matter, and the promulgation of more enlightened ones.

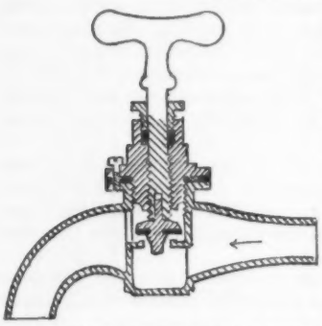
AS it appears, the calming property of oil on water agitated by the wind is due to the lack of adhesion between oil and air, and to the cohesion between the particles of the oil itself. A strong wind blowing over water clings to the surface, and easily separates portions of the liquid, which form spray, and this, mixing again with the water, and carrying down bubbles of air with it, throws the surface into a ferment, reducing the specific gravity of the superficial layers, and rendering them more subject than ever to be caught up by the wind, especially when lifted in waves above the normal level, and blown forward, producing the appearance which we call the curling of the wave, and exposing to destruction a small vessel which may happen to be under the falling mass. If oil is poured upon water in this condition, it spreads in every direction, retaining, however, by the cohesion of its particles, its connection with the nucleus, so as to form an almost unbroken film, over which the wind slips, without being able either to lift it or to act upon the water beneath it, and the waves which are propagated under the film from outside no longer tend to break or curl over, but appear as a heavy, but not dangerous ground-swell. So extraordinary is this cohesive and lubricating power of oil that a film of almost incredible thinness is sufficient to keep the wind and the water apart. It is found by many trials that a ship, driving before a gale, can keep smooth water around itself and for an indefinite distance behind it, with an expenditure of two quarts of oil an hour. Many vessels have done the same with less than one-third this quantity of oil, but, taking the larger quantity, and supposing that the average width of the smooth track is about the same as the width of the ship, which must be far within the truth, and that the film lasts an hour before it is dissipated, we can easily calculate, if the vessel drives at the rate of ten knots an hour, that the two quarts of oil must spread over an area of about two million square feet. A quart contains something over sixty-nine cubic inches, so that the thickness of a film of this size, produced by two quarts of oil, would be about one two-millionth of an inch.

NOT long ago, the French Admiral Cloué collected the reports of our Hydrographic Bureau, and, adding to them some observations of his own, presented the subject before the Academy of Science in Paris, where it excited great interest, and we find an abstract of his discourse in the *Revue Industrielle*. At present, the ordinary way of using oil in storms at sea is to prepare a sailcloth bag, of about ten quarts capacity, and fill it with oakum, saturated with oil. A quantity of free oil is then poured on the oakum, the bag securely closed, and some holes made in the bottom with a sail-needle. The vessel being put before the wind, two such bags are hung over the stern, so that the oil may cover the wake of the ship, and suppress the waves that threaten to break over the stern. This it seems to do with perfect success, the billows ceasing to curl forward under the action of the wind, and becoming simply swells, not dangerous if the ship is properly managed. As, however, an attack may be made from the quarter, instead of directly astern, some captains prefer to hang the bags over the side, a little forward of the stern, or even as far forward as the catheads, so that the rolling and plunging of the ship may spread the oil, and increase the width of the smooth track. If the ship is hove-to, several oil-bags are suspended over the windward side, and the lee-way which the vessel makes soon leaves it protected from the waves by a stretch of smooth water; while some captains have been ingenious enough, by carrying the oil as far forward as possible, to keep on their course, protected on the windward side by the greasy film. As to the sort of oil to be used, it is found that fish oil is most effective, that from seals or porpoises being the best. Mineral oils have answered a good purpose, but are rather too light; and vegetable oils, such as palm oil, sometimes become solid in cold water. It is rather touching, as indicating the desperate straits to which ship-masters are sometimes reduced, to read of the expedients which have been tried; one vessel, for want of oil, having saved itself by pouring varnish on the waves; while others have collected the butter and lard from the galley, and melted it down to throw overboard. However the greasy matter may be obtained, there can be now no doubt of its efficacy. A great number of captains have put their opinion on record that their ships would have been swamped but for the use of oil, and the life-saving boats on the Australian coast have been for several years regularly drilled in running out to sea through the surf on the reefs in bad weather by scattering oil around them. This is done so skilfully by the crews that they row across the reefs as it were through a lane of smooth water, while the breakers rage on each side. In a similar way, the passengers and crew have recently been transferred from a sinking ship to another in a storm by small boats, after scattering oil from the windward vessel until the water between the two became calm enough to be safely navigated by such little craft.

AT the late Congress of French Architects, which took place in Paris, recently, an extremely interesting paper was read by M. Maspéro, the official archæologist of Egypt, and Director of the Boulak Museum, upon the work now going on in the vicinity of Thebes. As every one knows, Thebes was, at one period in the history of Egypt, a city of great importance; and, although, according to M. Maspéro, it could never have had more than a hundred thousand inhabitants, it is said by Herodotus to have had a hundred gates, and, apparently from some idea of its sacred character, formed the centre of an extraordinary group of tombs, monuments and temples. Among the temples, the two largest were situated in villages outside the walls, one named Karnak and the other Luxor. Of these, that at Luxor is much the oldest, having been begun by Amenophis, or Memnon, nearly thirty-five hundred years ago. The temple stood on the bank of the Nile, and soon acquired great fame, so that, like the pilgrimage churches of modern days, it became necessary to enlarge it. According to M. Maspéro, an Egyptian temple, besides being the scene of grand solemnities, was nearly as busy a place as a mediæval convent. Tithes and ecclesiastical fees were usually paid in agricultural produce, so that the building of barns and granaries had to keep pace with the popularity of the shrine; and the priests living in the temple, with an eye to the main chance which is not yet altogether unknown in the world, usually secured from the royal authority some monopoly, such as that of furnishing linen for wrapping embalmed bodies, or of providing all the bread to be eaten by persons attached to the ecclesiastical service, so that the temple became a manufacturing establishment, as well as a storehouse of provisions. All this business needed accommodations, and the famous Luxor temple became a vast group of buildings, partly of stone and partly of sun-dried brick, extending in an irregular line along the river-bank. One hundred and fifty years after the foundation of the temple by Amenophis, Rameses I added to it an enormous vestibule, with the usual interior peristyle, and a colonnaded ante-room making the whole length nearly a quarter of a mile, and embellished it, after the Egyptian taste, with four huge pylons. Not content with this display of zeal, Rameses I increased the size of the palace-temple already existing in the suburban village of Karnak until it surpassed in size the strictly ecclesiastical group at Luxor, and, finally, united the two by an avenue, more than a mile long, guarded by one thousand sphinxes, which lined it on each side. This extraordinary work soon began to fall into decay, and two hundred years after its completion the palace at Karnak had become also the state temple, and Luxor was abandoned. Some centuries later, Thebes itself was destroyed by the Romans, and the miserable inhabitants took refuge in the ruins of the temples. That at Luxor seems to have afforded them better accommodation than the other, and the great halls were soon subdivided into tenements, while the courts became filled with huts, which perched even on the tops of the pylons. The débris of habitation gradually covered the pavements, until, when M. Maspéro began the work of excavation, he found a population of more than three thousand people living within the temple walls, in huts, which in some instances, stood on a soil raised sixty feet above the original pavement. Before any explorations could be made, it was necessary to expel the inhabitants of the building, and this has been done with some difficulty; but the place is not only now clear, but the excavations are well advanced, and we may expect to hear of valuable discoveries before long.

THE WATER-SUPPLY OF BUILDINGS.[1]—VI.

SUPPLY—FAUCETS.



"Hand-closing" compression-cock, "direct" acting, with loose valve.

COMPRESSION-cocks may be subdivided into "*Hand closing*" and "*Self-closing*" cocks, and each of these classes may again be subdivided into "*Direct*" and "*Indirect*" acting.

The initial-cut and Figure 9 represent "hand-closing" compression-cocks, with "*direct*" action, that is, the valve itself is actuated directly by the movement of the handle of the faucet. These examples differ from that illustrated in Figure 8 only in having a loose valve guided by a small guide-rod loosely fitting into a hole in the bottom of the main stem of the handle. The object of having the valve loose is to avoid the rotation of the valve-cushion and consequent abrasion in closing without the use of the square piston of Figure 8, which greatly increases, by friction, the wear on the threading.

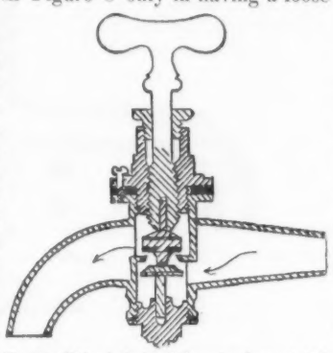


Fig. 9. "Hand-closing" Compression-cock with double Valve.

Unfortunately, this loose construction of the valve involves the serious objection of rattling or hammering when closing under high pressure, and consequently it cannot be recommended. Figure 9 differs from Figure 8 in having a double valve, one above and one below the water porte, so that when the cushion on the upper valve wears out, it may be removed and replaced by a new one without shutting off the water from the rest of the house or using a special shut-off cock, since the lower valve itself serves as a shut-off cock when the main stem is removed. In most cases the increased complication of the double valve more than offsets its advantage.

A better method of obviating the abrasion or grinding of the cushion in closing is to employ some form of lever instead of the screw movement. Figure 10 illustrates a faucet constructed on this principle. The mechanism is, however, here such that the closing is as rapid as that of the ground cock, being governed by a single turn of the handle, whereby under high pressure water-hammer is liable to be produced. The evident advantage of this over the ground-cock is the freedom from injury by grit in the water or accidental marring of its valve surface, which it possesses in common with all compression work, as well as the ease with which its valve is repaired in case of damage.

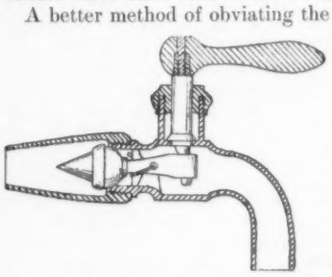


Fig. 10. Compression-cock with direct lever movement.

To obviate all the objections referred to in faucets they should be made *slow closing* under the lever principle of compression work, and act *indirectly*, as will be explained hereafter.

HAND-CLOSING FAUCETS ACTING INDIRECTLY.

Figure 11 illustrates the application of a small auxiliary valve to a hand-closing faucet. By its means the main valve is caused to open and close slowly. The main valve has cast upon its upper surface a piston of larger diameter than itself, which works loosely up and down in a cylinder formed in the body of the apparatus. A very small passage-way connects the cylinder above the piston with the outlet-nozzle of the faucet. This passage-way is opened or closed by a small auxiliary valve operated by the handle of the faucet. In its normal condition the small passage-way stands closed by the auxiliary valve and water stands in the cylinder above the piston, and the main valve is closed by the pressure of the water on the upper surface of the piston. When it is desired to open the faucet, the small valve is opened, relieving the water-pressure from the top of the piston, which causes it, and the main valve attached to it, to rise under the influence of the unbalanced water-pressure below. The speed of opening is governed by the rate at which the water above the piston can escape through the small valve and passage-way. The main valve remains wide open until the auxiliary valve is again closed. Water-pressure again accumulates above the piston and overbalances the pressure on the lower side. This and the weight of the piston cause the valve to close slowly, its speed being governed by the rate at which water can enter the cylinder around the edge of the piston, or, in other words, by the closeness of the fit of the piston in the cylinder. In this manner water-hammer is avoided.

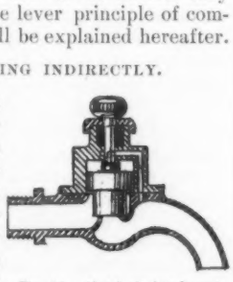


Fig. 11. Hand-closing faucet with indirect action.

The objections to this mechanism are, first, the complication arising from the use of two valves, which increases the cost and doubles the chances of leakage, and, second, the liability to stoppage of the minute passage-way through grit and sediment in the water. All water conveyed in service-pipes contains organic and inorganic matter in suspension, in particles varying in size from grains of fine sand and microscopic bacteria to small pebbles, fishes and even full-grown eels. The heavy deposit which collects in the bottoms of house-reservoirs shows the quantity of matter carried even in the clearest water. Therefore, small, unscoured passage-ways and delicate machinery should always be avoided in water-supply apparatus.

SELF-CLOSING FAUCETS.

In order to provide against waste of water through carelessness, ignorance or malice, innumerable devices have been invented, of which we illustrate the leading types. They are all generally known as "self-closing" cocks, and are likely to increase in popularity with the price of water and with the increase of individual responsibility for water-waste through the extension of the private meter system.

The great drawbacks to the use of the self-closing faucets as now generally made are the inconvenience and difficulty of handling them, and their want of durability and reliability. Those which close against the water-pressure and depend upon the tension of a spring to keep them tight, require for handling considerable strength of fingers, so much so as to render their use generally uncomfortable and sometimes even impossible, and it is always annoying to wait with one hand on the faucet until a sufficient quantity of water for use is drawn. The spring must evidently be made strong enough to overbalance the highest water-pressure likely to be encountered, and not only this, but it must have a reserve of strength sufficient to allow for a gradual loss of tension under constant strain, and to ensure tightness at all times, even under sudden shock or water-hammer in the pipes. Now the fluctuations of pressure in water-mains are so great that, whereas at one time the pressure of the spring may be largely offset by that of the water, at another it may be almost entirely unbalanced, and the strength required to operate the valve is then very great. Moreover, it is precisely at that moment when the effort to open the valve is greatest that it must be longest sustained, since it is then that the water runs slowest. Under such a strain the life of the spring is rapidly exhausted, and frequent leakage and need of repair is the result.

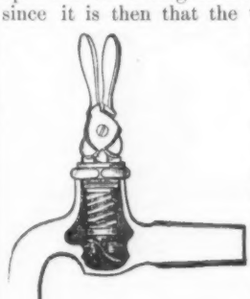


Fig. 12. Self-closing faucet with direct action.

Self-closing faucets may, like the hand-closing work, be divided into two kinds, namely, "direct," where the valve is opened by a spring or lever to which manual force is directly applied, and "indirect," where this is done indirectly as through an auxiliary valve. The former, with spring action, are objectionable in the same way as are ground faucets, on account of the water-hammer, due to the sudden movement of the spring.

Figure 12 represents one of the best and most popular forms of self-closing cocks, with direct spring action. The ingenious arrangement of the "double lever" furnishes the easiest means of overcoming the resistance of the spring.

[1] Continued from No. 602, page 15.

Fig. 13 illustrates clearly the principle of the lever construction which forms the distinguishing feature of this particular device. In its usual form the upright rod between the levers, with its cross-bar, is omitted, as shown in Fig. 10, and the valve is raised by simply pressing the two lever-arms together with the hand. The upright rod is applied where it is desired to operate the valves by a vertical movement of the hand as in the case of some forms of water-closet supply. The drawings are so clear that nothing further is required to thoroughly explain the device.

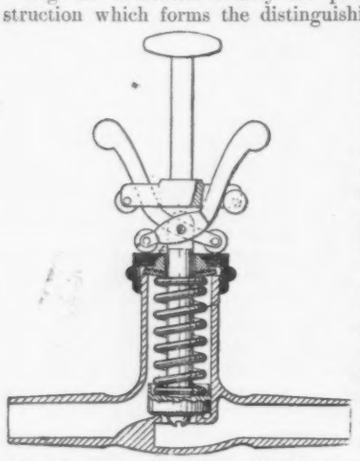


Fig. 13. Section showing the principle of the lever action.

In Fig. 14 a single lever is used in combination with a stationary arm serving as a hand-rest. This form is characterized by a swinging connection or joint between the lever and the valve stem permitting of the raising of the latter with a minimum of friction, and by the use of the rigid arm or finger-rest below so arranged that both the lever and the finger-rest may be grasped by the hand.

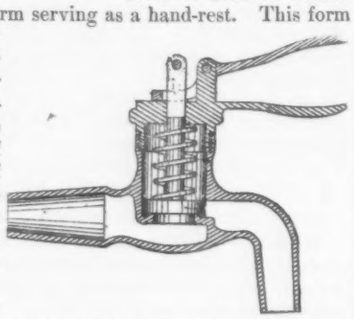


Fig. 14. Self-closing faucet, with single lever and swinging joint.

In Fig. 15 still another form of lever for compressing the spring has been adopted. In this apparatus the form and operation of the handle are like that of an ordinary screw non self-closing compression faucet, in that it is turned about its own axis. In so turning one of two lugs, which is shown between the two discs in Fig. 16, acts as a lever-end bearing against the cross-bar shown at the top of the valve-handle in Fig. 15, thereby raising the valve. In whichever direction the handle is turned, one of the two lugs presses up the cross-bar and its valve. The two lugs are shown also in Fig. 15 in section, of triangular form, under the cross-bar.

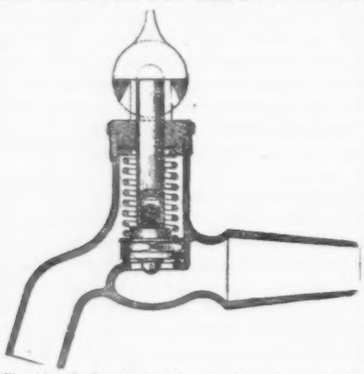


Fig. 15. Self-closing cock, operated by turning a key or handle on its own axis

This method of compressing the spring by turning a key or handle on its own axis requires, for an equal spring resistance, greater manual effort than the others on account of the shortness of the leverage usually attained therein. Unless the cross-bar forming the handle is of unusual length, giving the faucet an awkward appearance, the short and long arms of the lever are too nearly alike to render the operation easy except for the strongest hands.

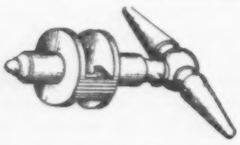


Fig. 16. Handle with its two lifting lugs or ears.

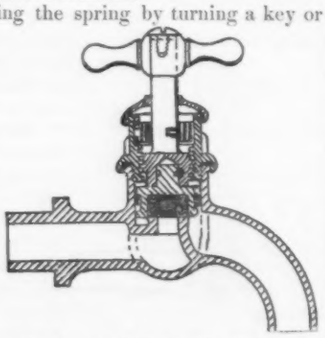


Fig. 17. Self-closing faucet, with threaded stem and volute spring.

In Fig. 17 is illustrated a type of self-closing cocks, in which a volute instead of a spiral spring is used with a threaded handle-rod. The valve revolves loosely in a socket in the handle-rod, to prevent abrasion of its cushion. Rattling is prevented by a small pin on the handle-rod which engages in an annular groove or slot around the small upper extension, or spindle, of the valve. The external threading at the bottom of the handle-rod causes it to rise or fall by its revolution in one direction or the other.

The volute spring has one of its ends secured to the handle-rod, and the other to the outer case or casting, and causes the rod to turn back and close the valve automatically after it has been released. The pitch of the threading regulates the speed of the closing.

Evidently, this construction is objectionable and unreliable both on account of the great amount of friction on the thread-

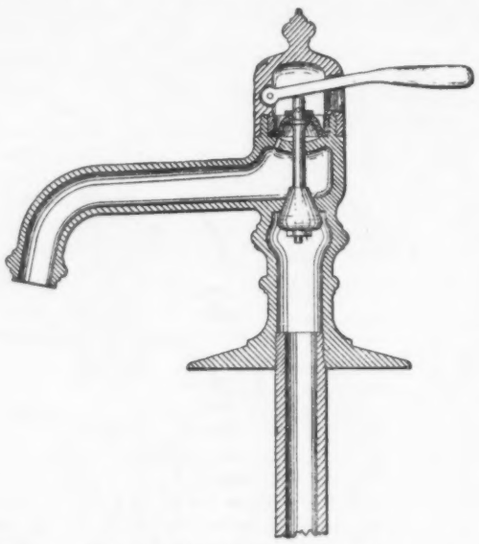


Fig. 18. Self-closing faucet with rubber spring.

ing, and on account of its general complication. It has very little durability. The volute spring is too feeble to properly perform its functions under heavy pressure as it is here constructed.

In Fig. 18 a rubber spring is used. The spring serves also as a packing to prevent leakage round the valve-rod. The form of lever shown best illustrates the principle of the valve, but is not the one used. It has ample power, but an uncouth appearance, besides leaving an aperture in the casing for its play, through which dust enters the working parts and mischievous persons are tempted to push obstructions. As the faucet is usually constructed, a different form of lever not having this objection is used, in which the handle is made after the principle of a thumb-nut minus the screw-thread, operating with a rotary movement, and having two inclined cams working on corresponding cams fixed on the body of the faucet to effect the opening of the valve. Its closing is effected by the elasticity of the inverted cup-shaped rubber diaphragm forming the spring, whose speed of movement is regulated by the size of the small vent-hole directly underneath. The sample tested by the writer works very easily and without hammer under heavy pressure.

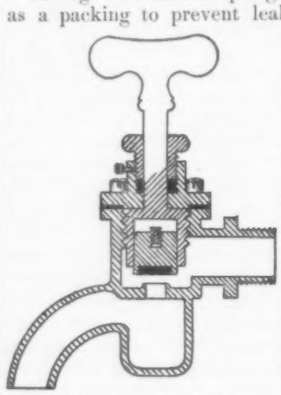


Fig 19. Self-closing faucet with loose plunger.

Fig. 19 represents a self-closing faucet, in which gravity is employed instead of tension, to close the valve. The valve-cushion is fixed upon the bottom of a free-moving plunger, loosely sliding in a cylindrical cavity in the lower end of the valve-rod. The valve-rod is threaded and moves up and down like that of an ordinary screw-down compression-cock. When the rod is raised the plunger follows through suction, but gradually falls under the influence of its gravity, the rapidity

of its motion being governed by the closeness of its fit in its socket or cavity, and by the small regulating screw on its upper surface, which limits more or less its upward movement.

SELF-CLOSING FAUCETS WITH INDIRECT ACTION.

We now come to the indirect principle of action in self-closing work. The main valve is actuated not directly by the handle-rod, but indirectly through the agency of a small auxiliary, trip, or relief valve. The small valve is opened by the handle-rod, and closed by a spring. The opening of the small valve relieves the upper surface of the main valve of its water-pressure, and causes it to rise in the same manner with that described in Figure 11. The closure of the small valve by the rubber spring forming the packing at the top of the faucet, causes the water-pressure to gradually accumulate again above the main valve, and slowly close it. The speed of closure is governed by the looseness of the fit of the plunger forming the body of the main valve in the cylinder in which it works, and by the small regulating-screw on its upper surface, which, as in the last described appliance, limits more or less its upward movement.

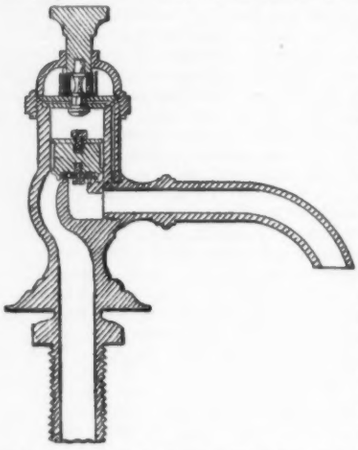


Fig. 20. Self-closing faucet, with small auxiliary valve.

Fig. 21 shows a pressure-relieving valve constructed on the same principle with the last described, except that the small valve is operated by the pressure of water in the pipes rather than by the hand. When the water-pressure reaches a certain amount, it lifts the weighted stem of the small valve by pressing on the elastic diaphragm at the top of the faucet, until the pressure overcomes the weight on the stem. This opens indirectly the main valve, until the pressure is relieved and the action is reversed.

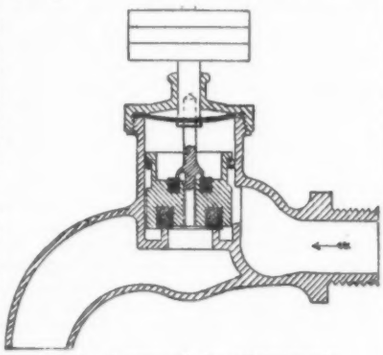


Fig. 21. Pressure relieving self-closing valve.

J. P. PUTNAM.

[To be continued.]

A CARPENTER'S PLUMBING. — Lake Geneva, is a lovely resort in Wisconsin, liberally patronized by wealthy Chicago people and others, who have built pleasant summer cottages and enjoy themselves as much as they can away from home. One of Chicago's brainiest plumbers was at this charming place recently and was sought out at the hotel by a local carpenter and requested to look over a job of plumbing, which the local shover of the plane had just finished in one of the best residences of the place. The plumber's fears were immediately aroused that he should see some plumbing wonderfully and fearfully made, but his worst fears could not forecast the surprise that awaited him. The carpenter, true to the idea which made the old shoemaker exclaim "There is nothing like leather," had constructed his soil-pipe of wooden pump-logs having a four-inch bore. The water-closet had a lead trap under it right enough, but the end of the lead pipe had been rimmed out so as to make a flange, which was nailed to the pump-log so as to connect with a hole through its side! From the bath-tub a straight lead pipe connected with the wooden soil-pipe through an augur hole through its side, the carpenter, evidently, realizing that while it was highly important to have a trap under the closet, it was not at all necessary to have one under the bath-tub. The wooden soil-pipe was continued to the basement where it entered a square-box drain leading to a wooden cesspool not far away.—*Sanitary News.*

PARIS GOSSIP.

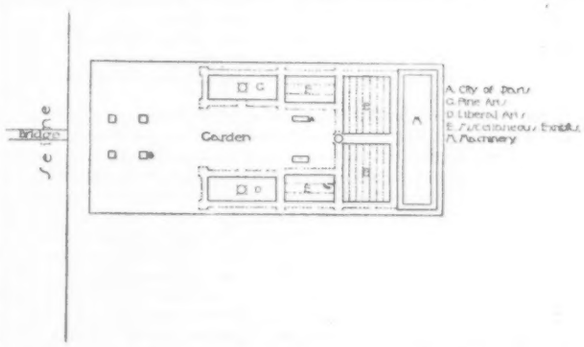
I WISH first of all to make good an omission from my last letter, and bear testimony to the emotion caused at the École des Beaux-Arts, and among all of us who have studied there, by the generous gift of our old American comrades. We have always had for you, we Frenchmen, the sentiments of real sympathy, and you have left among us at the atelier many charming recollections of good comradeship. The subscription that you have opened for founding at the École the *Prix de Reconnaissance des Architectes Américains* only knits closer than ever those bonds of friendship and sympathy which, in spite of the great distance which separates us, make us forever, heart and soul, your friends. In the name of all my French comrades, thanks.

I am going to speak to-day of the works of the Univeral Exhibition of 1889, and of the Concours de Rome, which has just been decided at the École des Beaux-Arts.

The workshops of the Universal Exhibition are in full swing; everybody is at work on the spot, and in the offices drawings are accumulating and the studies of details are being finished.

First, a word as to those who direct and organize the Exhibition. The director-general is M. Alphand, Director of Public Works in Paris and Inspector-General des Ponts et Chaussées. The Exhibition is divided into three groups. First, the fine arts and the liberal arts, of which the architect is M. J. Formigé; second, the miscellaneous group, of which M. J. Bouvard is the architect; third, the machinery building, at the head of which is M. F. Dutert, architect. The director-general in charge is M. G. Berger; and M. Paul Sédille, architect, will be employed in installing the French and foreign exhibits.

The Exhibition of 1889 will take place, as have former ones, upon the Champ de Mars, connected with the Trocodéro by the Pont de Jéna. The agricultural exhibition and the exhibits of the colonies will extend along the quays as far as the Invalides. As the sketch of the block-plan shows, an effort has specially been made to give to the gardens and the portions devoted to amusements as large an area

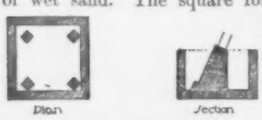


as possible. These have been made the centre of the Exhibition, and it is about these gardens that have been grouped the buildings of the Exhibition, properly so-called. These buildings almost cover the entire surface of the Champ de Mars, leaving between them and the exterior avenues only a space of no great importance. Opposite the Military School, and running the full width of the Champ de Mars, is the machinery gallery, of which the metallic trusses have a span of one hundred and fifteen metres. At this moment they are building the foundations of this gallery, and the contract for the iron has just been awarded. After the machinery gallery comes the miscellaneous group, that is to say, the exhibition

of products of all kinds. This part of the Exhibition has the shape of an immense rectangular horseshoe. It is composed of twenty bays, which are arranged as the sketch shows. The fourteen parallel bays of the machinery gallery are separated by a central passageway. The span of the trusses is twenty-five metres. The central motive of the façade that looks on the garden — the real façade of the Exhibition — will be a dome sixty metres high, all of iron, and enriched with decorative features, stained-windows, tile-work and terra-cotta. On each side of the dome will extend porticos, which surround the whole Exhibition. Under these porticos, which are fifteen metres wide, will be the cafés, restaurants, etc. These porticos will also surround the two pavilions of the fine arts and the liberal arts, which are found in the prolongation of the two wings of the miscellaneous group. These two pavilions, very richly treated, will be crowned by two domes, decorated with enamel, upon the decoration of which much of the success of the Exhibition is thought to depend. The city of Paris will have its pavilion in the garden at "A," opposite another pavilion of similar character.

The somewhat heavy-looking trusses of the miscellaneous group are already in place, and the foundation of the pavilions of the fine arts and the liberal arts are also laid. One can now appreciate the good points of the general plan. The idea of making the garden, where will be found all kinds of distractions and amusements, the central feature of the Exhibition is excellent. It will not be necessary, as in the Exhibition of 1878, for a person at one end of the building to pass through all the buildings to reach the gardens, which in that Exhibition were scattered in several places.

The Eiffel three-hundred-metre tower also progresses. It is on the bank of the Seine on the axis of the Pont de Jéna. It will form on this side a monumental entrance to the Exhibition. As you already know, the tower is borne by four metallic arches, which rest normally upon four masonry piers. For the two piers which are farthest removed from the Seine a solid foundation has been found at the depth of seven or eight metres, but for the two nearest the Seine the difficulties have been more serious, and a solid bearing has only been reached after having excavated to great depth through courses of wet sand. The square formed by the four piers is about one hundred metres on each side; each pier is twenty-six metres square, but is not formed of a solid mass of masonry. The engineers have been satisfied with offering a solid point of support to each of the four arched ribs which form the caisson of each metallic arch. The surface of these four points of support is obliquely inclined, so that the arches rest upon them perpendicularly. Two strong bolts, fifteen centimetres in diameter, are fixed through each of the points of support, and lying in the same vertical plane they serve to preserve the equilibrium during the raising of the arches, which are built out of perpendicular [*en porte à faux*]. M. Eiffel has built the arch to the height of twenty-five metres without the use of any other point of support. Once the arches erected, these bolts will have no real effect, the tower owing its stability to itself and its own weight. In one of the piers is the elevator. The foundations are laid, and the iron arches begin to rise and approach one another. When one sees the work going on at the site of the tower one is astonished at the magnitude of this enterprise. I cannot guess the effect which the tower will produce from an artistic point of view. It is surely a gigantic structure, most interesting for all of us to follow during construction, and if its usefulness is not yet absolutely demonstrated, it will have unquestionably a grand *succès de curiosité*. The construction, if we may judge by the part that is begun, is very bold, and the iron arches are very light in appearance.



Such is the present condition of the works at the Exhibition grounds. They will make progress now with great rapidity, and I will keep you posted on everything of interest that takes place there.

The competition for the Prix de Rome has just been decided at the École des Beaux-Arts. Let me remark first, the success of the competition in painting. This year it was very good. The subject was this: "Themistocles, exiled from Athens, sought an asylum with the king of the Persians, Artaxerxes I, who showed him magnificent hospitality, and who tried to make him bear arms against the Greeks. In order to avoid obedience, Themistocles, in the midst of his family, drank poison, exclaiming, 'Behold the last sacrifice that I make for my country.'" The subject, you see, was quite interesting and lent itself to a very artistic interpretation. Surely, in it could be sought, besides the composition and arrangement of the painting, the expression of a lofty sentiment of patriotism on the part of the chief figure. It is in this last particular that the ten competitors have failed, with the exception of one who carried off the Grand Prize.

Among the competitors were five pupils of M. Cabanel, — MM. Bastet, Sinibaldi, Lavalley, Jouve and Tollet; three pupils of MM. Bouguereau and Robert Fleury, — MM. Charpentier, Marioton and Lenoir. MM. Boulanger and Fabre had one pupil. — M. Boufet. And finally, the prize-winner came from the studio of MM. Gerôme and Millet. This was M. Henri Danger. His painting was surely superior to all the others.

Themistocles standing alone in the foreground of the picture, holds in one hand the cup of poison, with the other he gives a last hand-grasp to one of his grieving friends. Themistocles turns his back on his friends, not wishing to share their sorrow. The physiognomical expression is profound and dramatic without being theatrical. This man, we feel, is about to die. There is abundance of sentiment and emotion here. M. Danger is the only one who has succeeded in rendering truthfully this most human characteristic. Themistocles is clothed in perfectly-rendered and very clinging white drapery which covers his entire body and is wrapped about his head. M. Danger perhaps in this way wished to escape the difficulties of the nude; but, nevertheless, his composition is good, and we find ourselves face to face with an artist who has fairly won his Grand Prize

The First Second Grand Prize has been awarded to M. Jean Marioton for a good composition, luminous in tone and well modelled. Themistocles seated, his body bare, and holding a cup in his hand, is well drawn and rendered; but no one feels that emotion which he experienced a moment ago. It is correct, but cold.

The same might be said of the Second Second Grand Prize gained by M. Charpentier, pupil of the same masters. It is almost too well composed, yet it is not absolutely theatrical, and has some characteristics of human nature about it, but it smacks more of the School and Academy. The other candidates in whose work we find many good qualities of drawing and rendering (I mention among others M. Sinibaldi's, which is distinguished by a charming bit, a nude female, seen from behind) almost all gave to the principal figure a pretentious and affected attitude. In spite of this, the competition was better than that of last year, and we may hope that these young artists will later give us more interesting work from every point of view.

The competition in sculpture was, on the other hand, very inferior to its predecessors. The competitors had to treat in bas-relief the following subject: "Creon, having abducted the two daughters of Œdipus, exiled and blind, Theseus delivers them and restores them to their father. Œdipus stretches out his arms to them, calling on them to approach that he may press them to his heart." All the subjects exhibited were absolutely wanting in feeling, and for the most part the figures were also lacking in proportion — limbs either too frail or too massive, — giants or dwarfs. All this was not satisfactory. M. Jean Desvergnes, pupil of MM. Thomas and Chapu, nevertheless distinguished himself by a better composition and a better arrangement of his figures, and a very graceful disposition of draperies, which were supple and well rendered. I no not know why M. Desvergnes only received a First Second Grand Prize. The first prize was carried off by M. Edgar Boutry, pupil of M. Cavelier. The Second Second Grand Prize was won by M. Jean Soulès, pupil of MM. Jouffroy and Falguières. I will not say anything of their very ordinary performances, except that they had worked hard upon them.

And now for architecture, and the large frames which cover the walls of the Hall of Melpomene, a work which is enormous so far as dimensions and also study are concerned, but which is only of slight interest to the ordinary public. It must be confessed that a certain amount of education is needed to judge and appreciate these efforts of our young comrades. The competition this year was unfortunately classic, and, given the system of the École des Beaux-Arts, offered few excuses for new ideas or novel expressions. This time we do not get out of the realm of mere typical plans, and the model façades which we so well know in the atelier.

The ten competitors admitted to the final proof were, in the order of their admission, MM. Tournaire, pupil of M. André; Chedanne, pupil of M. Gaudet; Lafon, pupil of M. André; Bertone, pupil of M. Ginain; Sortais, pupil of MM. Daumet and Girault; Eustache, pupil of M. Ginain; G. Cousin, pupil of MM. Coquart and Gerhardt; Heublès, pupil of M. Pascal; Raphel, pupil of M. Raulin; Lacoste, pupil of M. Ginain. The programme was a gymnasium: "This establishment, near a large city and a park, must testify through its monumental conception to the wealth of the municipality which built it. It must be composed first, of a hall for reunions and conferences; second, of a gymnasium; third, a natatorium; fourth, a tennis-court; fifth, a running-track for foot-races and athletic contests. These divisions must be preceded by a vast vestibule, with the ticket-offices and the rooms of the officers; a *porte-cochère* for carriages, a pavilion for the administration, and apartments for the director and the *personnel* of the establishment; a grand restaurant, with café and smoking-room must be placed so as to be accessible to the people who make use of the gymnasium." Such are the chief lines of the programme. Each division had to be accompanied, according to its intended use, with vestibules, porticos, closets, galleries for artists and professors, halls for rest, etc.

M. Georges Chedanne carried off the First Grand Prize. His plan was good, well understood, and compactly grouped. The entrance was distinguished by a large portico, whose central motive was a triumphal arch. On passing this portico, entrance was had into a vast court-yard, on the left of which was the natatorium, preceded by a large vestibule. On the right was the gymnasium. Perhaps these two divisions were not sufficiently studied. The natatorium was ornamented by a rotunda, and enlarged at its two ends by curved parts, which were not repeated in the gymnasium. At the back of this large court-yard, surrounded by a portico, M. Chedanne had grouped the three divisions which were more especially intended for the public, in that they offered the chance of exhibition; the tennis-court at the left, the hall for reunions and concerts on the right, and at the back a large apartment for racing, these three divisions having a common entrance through a large and grand vestibule. The restaurant was somewhat sacrificed to the lower story, and was placed in the first story, forming there a loggia. The façade was

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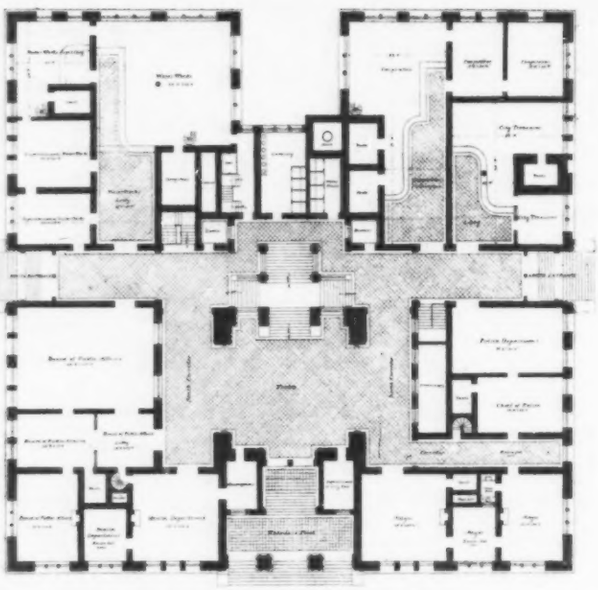
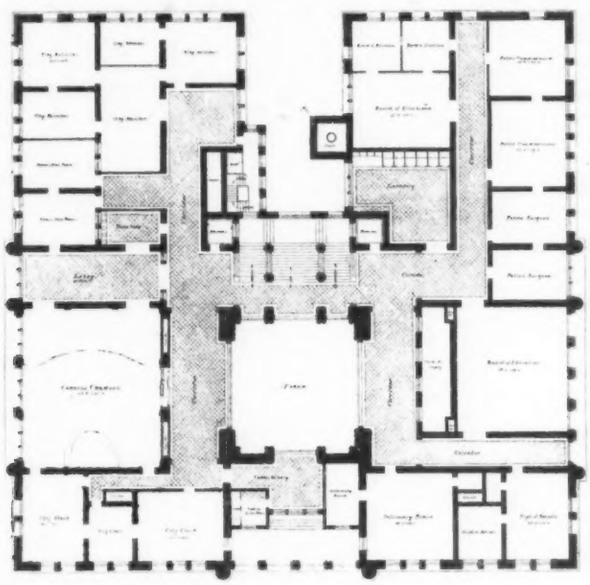


FIRST FLOOR PLAN

COMPETITIVE DESIGN FOR CITY HALL CINCINNATI, O.



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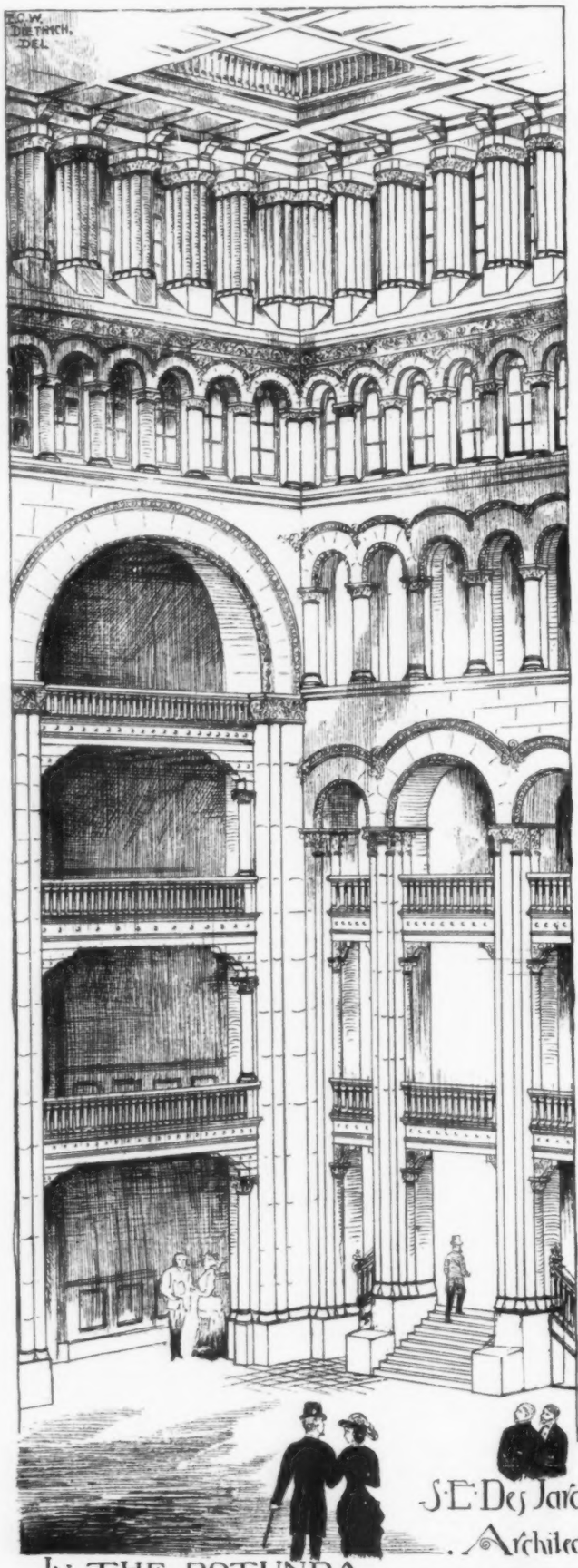

IN THE ROTUNDA

J.E. Des Jardins, Architect.

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HOUSE AT TUXEDO PARK N.Y.
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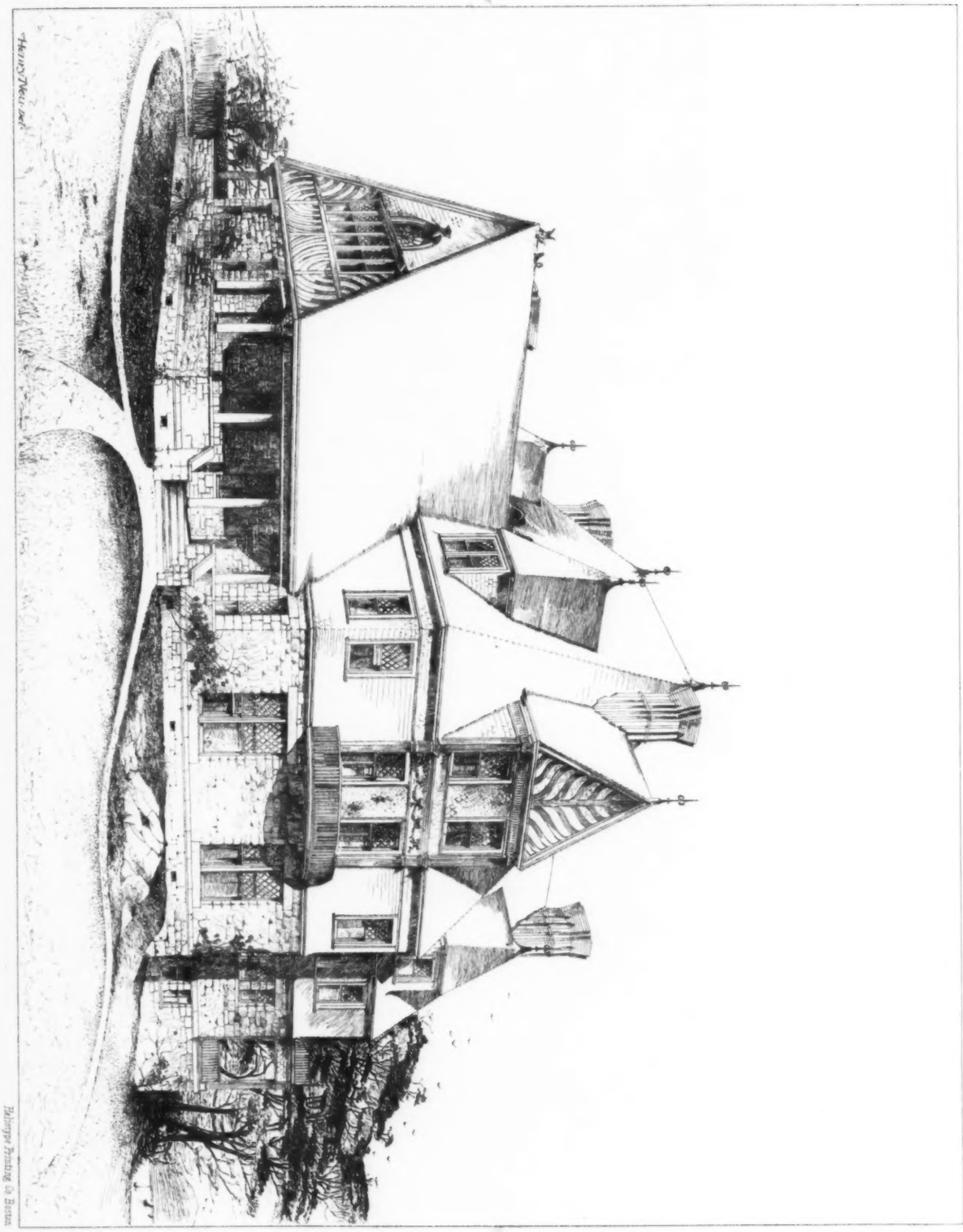

HOUSE AT TUXEDO PARK N.Y.
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Doorway of Church at Harfleur, France

somewhat complicated. The triumphal-arch was thoroughly commonplace. The porticos which accompanied it were classic. It was plain that something else should have been sought for, but M. Chedanne was, perhaps, right in sticking to the key-note he had selected. It does not pay to show too much originality in a struggle for the Grand Prize. His façade had, moreover, a good silhouette.

The First Second Grand Prize was awarded to M. Henri Eustache. His plan was compact. The entrance to the hall of reunion, the tennis-court, and the natatorium was easy, but the race-track at the rear was shut in by the gymnasium, and ill-arranged for access. The façade was classic, and had no silhouette. There were, to be sure, large porticos of good proportions, but everything was antique. In fact, it was a mere school *projet*.

M. Charles Heublès won the Second Second Grand Prize. His plan was quite attractive; nevertheless, the entrance, in spite of its width, was obstructed by points of support of too great magnitude; his race-track was too far off and too isolated. He sought circular arrangements and complicated forms, whose real purposes were not clearly indicated. His façade was interesting, in spite of its poor proportion. Silhouette was not lacking, but the rendering was disagreeable, and did injustice to the composition.

It was a pity indeed that M. G. Cousin received nothing. He had a charming plan, well arranged and well studied. Unfortunately, it was too pretty, too refined, too delicate. Evidently it did not have the amplitude and proportions demanded by the programme. All the same, it was a very pretty study.

M. Tournaire, who last year won the First Second Grand Prize, was nowhere this year. His plan was well presented, but badly constructed; all the parts were scattered. The gymnasium, which was large — too large — completely stopped up the approach to the natatorium and the hall of reunion, and this last was entirely isolated at the back of the building. His façade, on the other hand, was very fair, well studied, and well rendered. M. Tournaire sought something a little more original than his comrades. Unfortunately, the exaggerated importance given to the gymnasium was apparent in the façade, and made a long low line without silhouette. In fine, the competition was good, but interpreted in a commonplace fashion without evidence of personality.

I will close with mentioning the appointment of M. Th. Deck, the well-known *ceramiste*, to the post of director of manufacture at Sèvres, in place of M. Lauth, discharged. M. BRINCOURT.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE CHANNING UNITARIAN CHURCH, NEWTON, MASS. MR. G. F. MEACHAM, ARCHITECT, BOSTON, MASS.

[Gelatine Print, issued only with the Imperial Edition.]

COMPETITIVE DESIGN FOR THE CITY-HALL, CINCINNATI, O. MR. S. E. DES JARDINS, ARCHITECT, CINCINNATI, O.

HOUSE FOR PIERRE LORILLARD, ESQ., TUXEDO PARK, N. Y. MR. JOHN BROWN LORD, ARCHITECT, NEW YORK, N. Y.

SKETCH FOR HOUSE ON PARK AVENUE, NEW YORK, N. Y. MESSRS. KEISTER & WALLIS, ARCHITECTS, NEW YORK, N. Y.

DOORWAY OF THE CHURCH AT HARFLEUR, FRANCE.

BUILDING MATERIALS.[1] — III.

THE materials that come under the designation of stone as used for building purposes, consist either of the rocks belonging to the earlier geological formations (such as the various descriptions of granite,) or of deposits that are the result of the decomposition of such formations as represented by those that are of a sedimentary character. These sedimentary rocks may be classed under two heads, sandstones and limestones, some of them partaking of the nature of both, such as the Mansfield redstone, which is a siliceous magnesian limestone.

Of the sandstones there are a great variety, some of them being of too hard and too coarse a texture to be available for buildings the character of which necessarily entails a considerable amount of ornamental work, but they afford excellent material for plain heavy masonry, where strength and durability are the main points to be considered. We have examples of such material in the gray sandstones of Dundee and Arbroath, which have been much used for paving in Edinburgh and Glasgow, and of the coarser varieties in that which is known as Bramley Fall stone, used for Kirkstall Abbey, built in the 12th century, the name being derived from the quarry in the neighborhood of Leeds, whence this description of stone was first obtained. This quarry has been closed for some time, but the original name is retained, and now represents a quartzose sandstone, varying considerably in its texture, belonging to the millstone-grit formation, and obtainable in very large blocks from a number of quarries in Yorkshire, Lancashire, and Derbyshire. It is chiefly used for engineering works, such as engine-beds, dock-walls, and foundations, being especially adapted for massive work of every description where large blocks are required.

The finer descriptions of sandstone come under the designation of "freestone," a term that has no very distinctive meaning, but one which is commonly employed when speaking of any stone, whether it be a sandstone or a limestone, that is capable of being easily tooled, quite irrespective of its chemical composition. There is an ample supply of excellent sandstone for general building purposes both in England and Scotland. In England this is especially the case as regards the counties of Lancashire, Yorkshire, and Derbyshire, in which there are a number of quarries yielding a very durable material, which is, at the same time, sufficiently soft to admit of being easily worked with a chisel.

The stone from the Darley Dale and Knabb quarries, in Derbyshire, has been largely used in Manchester, and it would not be easy to find a better test of the durability of stone than subjecting it to the influence of such an atmosphere as that of the city of Manchester. The New Stanton and Coxbench quarries yield an excellent material for building purposes, some of the stone from New Stanton being also suitable for grindstones.

Of the Yorkshire sandstones, amongst those that have been longest known may be mentioned the Hare Hills and Park Spring stone, which have been extensively employed for many years in London and in various parts of the country.

The Scotgate Ash quarries, near Pately Bridge, yield an excellent building stone, some of the beds affording a material suitable for landings. A fine grained sandstone is obtained near Sheffield, which has few rivals as regards its properties as a grindstone, and in the district which lies between Bradford and Halifax are obtained in large quantities the flagstones for which Yorkshire possesses such a high reputation. The red Corsehill stone from Annan, in Dumfries, is one of the finest of our red building stones. It is uniform in its texture, of a rich deep red color, which is but little liable to alteration. This stone is peculiarly adapted for use in conjunction with bricks or terra-cotta, and has been employed with good effect for several buildings in London and its neighborhood.

One of the finest sandstones is that known as the Craigleith stone, which has been very extensively used in Edinburgh. It is a close-grained compact stone, consisting almost entirely of silica, the particles of quartz sand being bound together by a siliceous cement, the total quantity of silica it contains, as shown by analysis, amounting to ninety-eight per cent. The permanent character of this stone has been thoroughly established; exposure to the weather for 200 years having in some cases scarcely produced any effect upon it, but it is questionable, however, whether the stone now obtainable under this name possesses the excellent properties of the original supplies. The Minera stone from near Wrexham, in Denbigshire, has been largely used in Liverpool and Manchester, and was employed in London for the building near the Mansion House occupied by the National Safe Deposit Company.

At Grinshill, near Shrewsbury, there are quarries which yield a fine-grained building stone, of which there are three varieties, white, yellow, and red, which has been extensively used in Liverpool, Manchester, and Birmingham, and towns in the midland counties, as well as in London. This stone was employed for many of the churches in Shropshire, including Battle Church, standing on Shrewsbury battlefield, and has proved to be a good weather stone.

The Prudham stone, from the neighborhood of Newcastle, has within the last two or three years been introduced into London, and from the condition of this stone, which was employed for buildings in Woolwich Dock-yard some forty years ago, it may (if obtained from the same beds) be expected to prove a durable stone.

Uniformity of texture is an important consideration, more especially as regards sandstones, inasmuch as some of this class contain portions differing in character from the mass of the stone, showing a tendency to weather at a different rate. Sometimes such portions are less liable to alter than the mass, and are thus left as excrescences, whilst in other cases they weather more rapidly, and the stone presents a more or less pitted appearance.

Limestones, as a class, are quite equal in importance to the sandstones as regards the number and variety of the beds yielding an excellent material for building purposes. They differ widely from each

[1] A lecture by W. Y. Dent, F.C.S., F.I.C., read before the Society of Arts, and published in the *Journal* of the Society. Continued from page 102, No. 609.

other as regards their chemical composition, from white marble, which is pure carbonate of lime, to the magnesian limestone, in some descriptions of which the proportion of carbonate of magnesia is nearly equal to that of the carbonate of lime. Marble is generally regarded as the result of carbonate of lime having been subjected to intense heat in a confined space, where there was no opportunity for the escape of the carbonic acid, and consequently under great pressure. It is a highly crystallized carbonate of lime of a density equal to that of granite, weighing about 170 pounds per cubic foot.

Although we have not in England the beautiful white statuary marble of Italy, nor such deposits as would be required for a cathedral like that of Milan, yet we have in Derbyshire and Devonshire, marbles that leave little to be desired as a material for ornamental and decorative work.

The beautiful black marble from Ashford, in Derbyshire has been worked for forty years, the beds varying in thickness from three to nine inches. It has been extensively used for ornamental work in church buildings and public edifices, of which we have an example in the bases and caps of the balustrading round the ladies' gallery of St. George's Hall, Liverpool. The other varieties of marble from these quarries, as well as those from Hopten-wood, in Derbyshire, have been largely employed for ecclesiastical as well as other decorative work throughout the country. The Devonshire marble can be procured in very large blocks, and to such an extent is this the case that a polished marble tank, weighing when finished nine tons, cut out of a single block, has been supplied from the Oreston quarries near Plymouth. The marble columns at the Home and Colonial offices were also obtained from these quarries.

There are several other limestones that are of such a highly crystalline character as almost to entitle them to be classed with marbles, of which the Niddersdale limestone may be taken as an example. By far the larger portion of the limestone ordinarily used for general building purposes is derived from the beds of the oölitic system, so named from the particles of some varieties of these beds being more or less of a granular character, bearing a resemblance to the roe of a fish. This appearance is not of a marked character in many of the stones belonging to the oölitic series, but in some of the beds of Bath stone, and more particularly in the Ketton stone, it is too evident to escape the notice of the most casual observer. It is supposed that this appearance is due to the stone having been formed from the disintegrated particles of former limestones which have become rounded by attrition and deposited in a granular condition, or the carbonate of lime has been deposited upon some particle of sand or fragment of shell which was kept in motion by flowing water saturated with carbonate of lime. Such a production of oölitic grains may be observed in process of formation in the springs of Carlsbad. The most important of the building stones belonging to the oölitic system is undoubtedly that which is known as Portland stone, which may be regarded as the type of a good limestone for ordinary building purposes. It has been used more extensively than any other description for the public buildings of London. St. Paul's Cathedral, Somerset House, the National Gallery, the Custom House, the Post-Office, the Royal Exchange, and the new Law Courts have all been built of this material, and experience has proved that (when carefully selected) it is one of the best adapted for resisting exposure to the baleful influence of a town atmosphere. Fortunately for its reputation, great care has generally been exercised in preventing any inferior stone being employed. Sir Christopher Wren had the stone for St. Paul's Cathedral quarried and exposed to the air for three years before it was brought to London, a full opportunity being thus afforded for rejecting any blocks that exhibited signs of inferiority; the stone used for the Royal Exchange also underwent a special inspection at the quarries.

There are numerous quarries in the island of Portland, and a series of beds, only a few of which yield a really good material. Taking the Waycraft quarry as an example, we find that after sinking to a depth of twenty-five feet through several strata of but little value, and known by various local names, the Roach bed, two feet six inches in thickness, is reached. The stone of this bed is shelly and full of cavities, and consequently cannot be used for building purposes where a good facing stone is required; it is, however, hard and durable, and is employed for underground work, its money value not being more than about one-half that of the best Portland stone. Below this is the finest bed of the whole series, known as the Whit bed, nine feet, six inches in thickness; and after sinking eight feet deeper, through stone of little value, termed "curf," the lowest of the series, or base-bed, is reached, a name that has sometimes been converted into "best bed," which is somewhat misleading, inasmuch as, although sometimes preferred by masons, it differs slightly in its character from the Whit bed, and is considered inferior to it in durability. It also sometimes contains irregular bands of flint. The thickness of the several beds varies considerably in different quarries. This stone contains ninety-five per cent of carbonate of lime, the hard crystalline particles of which it is composed, as well as the material that binds them together, consisting of carbonate of lime.

The next stone in importance belonging to the oolitic system, is that obtained from several quarries in the neighborhood of Bath, with which every one is more or less familiar under the name of Bath stone. The several beds vary as regards the character of the stone they yield, perhaps to a greater extent than is the case with any other description, and unless great care is taken in its selection, it will generally be found to prove a failure if exposed to such an atmosphere as that of London. At the same time examples are not wanting of its exhibiting as much durability as other descriptions of limestone, and in one instance, where it has been used along with Portland stone in the same building, in which special care was taken in its selection, it exhibits fewer indications of decay than the Portland. The vast trade that is now carried on in Bath stone may be said almost to have commenced with the opening of the Great Western Railway, although the stone has for a long time been a favorite with builders, having been employed since the twelfth century.

The stone imported from Caen, in Normandy, was introduced into this country shortly after the Norman conquest, and was extensively used in building churches down to the middle of the fifteenth century. Its fine, soft, even texture, renders it peculiarly suitable for ornamental work, and there is no better stone for internal decorations involving elaborate carvings. It is not, however, a good stone as regards its capability of resisting the effects of exposure to atmospheric influences, and is quite unsuitable for the exterior of buildings erected in large towns. With but few exceptions, when exposed to a town atmosphere, it has proved a complete failure, its defective condition having had, in some instances, to be concealed by paint.

The Doulting stone, obtained from the beds of the lower oölite formation at the base of the Mendip Hills, in Somersetshire, resembles Portland as regards its composition, and also with respect to its density and porosity; and although it more resembles Bath stone in appearance, it is superior to it in quality. This stone was used for building Glastonbury Abbey, in the twelfth century, and for Wells Cathedral.

Amongst other stones belonging to the same class may be mentioned the Ancaster stone, from near Grantham in Lincolnshire, which has been largely used in that and the neighboring counties, and to some extent in London. The stone from Casterton in Rutlandshire was used for the cathedrals of Norwich and Ely, and in building some of the colleges at Cambridge. The Clipsham stone, from the same county, was employed in the restoration of the cathedrals of Ely and Peterborough, and is similar to what was formerly known as the Barnack stone, which acquired considerable reputation as a good weather stone. The Ketton stone, from near Stamford, has already been alluded to as possessing a very marked granular appearance, exhibiting its oölitic character to an unusual extent. It is a very excellent stone (of which we have a good example in the Church of St. Dunstan's, Fleet Street), and is somewhat peculiar in that it possesses but little if any distinctive line of bedding.

The Headington stone, from the neighborhood of Oxford, has been largely employed for many of the colleges and churches in that city, the condition of which does not afford any favorable evidence of the durability of the Oxford oölites, much of the stone of the colleges and other buildings in Oxford exhibiting signs of exfoliation and decay. One of the better class of the Oxford oölites is the Charlbury stone, used for the Central Barracks, Oxford. A stone has been largely employed in Oxford for several years past which is obtained from Milton, near Chipping Norton; it has acquired a favorable reputation with several well-known architects, and seems likely to prove more durable than most of the stone that has been generally used for the colleges at Oxford.

The stone which is known by three different names, Tisbury, Chilmark and Wardour, is obtained from quarries in the neighborhood of Salisbury, the original Tisbury quarry being now closed. It differs in its composition from the limestone before mentioned, inasmuch as it contains ten per cent of silica, which partly exists in minute particles forming nuclei, round which carbonate of lime has been deposited, and partly as a crystalline matrix, forming the binding material of the stone. Salisbury Cathedral was built of this stone, and it is now being used for the repairs of Westminster Abbey. The Kentish rag is a dense, hard, and very durable limestone belonging to the green-sand formation, largely employed in the south of England for forts and harbors. It is obtained from quarries in the neighborhood of Maidstone, where it occurs in layers from six inches to two feet in thickness, with alternating bands of a soft siliceous limestone, locally termed hassock; it is employed for many of the picturesque country churches in Kent, the hassock being used for the interior portion of the walls.

Of the siliceous limestones, the finest example is that known as the Mansfield stone, of which there are two varieties, the white and the red, both of which contain nearly fifty per cent of silica, associated with variable quantities of carbonate of lime and carbonate of magnesia. This stone, more particularly the red variety, has deservedly obtained a high reputation for the beauty and uniformity of its color, and the fineness of its texture.

The magnesian limestone, or dolomite, as it is sometimes called, has obtained a not very enviable notoriety from its having been selected for the Houses of Parliament at Westminster. The name dolomite belongs properly to a mineral of a peculiar granular and crystalline structure known as bitter-spar, which consists of fifty-four parts of carbonate of lime and forty-six parts of carbonate of magnesia, the name being derived from that of a French geologist who discovered it in the Alps. The magnesian limestones are very variable in their character, both as regards their chemical composition and their physical structure. The stone used for building purposes is chiefly obtained, in this country, from the counties of Nottinghamshire and Yorkshire, in the district which lies between

Mansfield and Chesterfield, stretching in a northern direction as far as Tadcaster. The quarries in the neighborhood of Tadcaster were known to the Romans, who employed this description of stone in the construction of the multangular tower, the ruins of which, in the Museum gardens at York, are still an object of interest. York Cathedral, erected in the thirteenth century, Ripon Minster, as well as many of the churches in York, are built of this stone, in many of which the signs of exfoliation and decay are but too evident.

The selection of magnesian limestone for the Houses of Parliament was decided upon chiefly on account of the very excellent state of preservation in which this stone was found at the Cathedral Church of Southwell, in Nottinghamshire, Roche Abbey, near Tickhill, and the Castles of Conisborough and Bolsover. The particular stone chosen was that from the quarries at Bolsover, in Derbyshire, whence the stone used for the church at Southwell had been obtained. The stone that could be supplied from these quarries was, however, found to be too small in quantity for so extensive a building, and blocks of sufficient size were not procurable; other sources of supply had consequently to be found, and the North Anston quarries, on the borders of Yorkshire, were determined upon.

The choice of magnesian limestone, notwithstanding all that has occurred, in connection with the defective condition of many portions of the building at Westminster, cannot be regarded as altogether an erroneous one. Magnesian limestone had long been regarded as affording an excellent material for building purposes. It was, in the opinion of Sir Christopher Wren, only inferior to Portland, and examples are not wanting which afford evidence of its capability of bearing exposure to such an atmosphere as that of London without injury, of which the Museum of Practical Geology, in Jermyn Street, may be quoted as an instance. The greatest care was taken in selecting the kind of stone to be used; a Royal Commission was appointed, consisting of men eminent for their geological attainments as well as for their practical experience, who undertook a laborious investigation, visiting all the principal quarries in England, and examining one hundred and fifty varieties of stone. The cause of the unsatisfactory condition of much of the stone employed in the building is unquestionably due to want of inspection at the quarries, and — as a necessary consequence of this laxity of superintendence — the inefficient manner in which the stone was worked. We find stones taken from the same part of the building, varying materially as regards their porosity and physical character, to such an extent as could not possibly have occurred had proper precautions been taken for preventing the arrival in London of any stone of inferior quality. The securing a proper supervision over all quarrying operations is of quite as much importance, as care in the selection of the description of stone most suitable for any building operations, of the truth of which the Palace at Westminster affords, unfortunately, plenty of evidence.

A very excellent stone of this class is obtained from Huddlestone, situated between Sherburn and Tadcaster, consisting of fifty-four per cent of carbonate of lime, and forty-one per cent of carbonate of magnesia, of which we have an example in London in the cross erected in front of the Charing-cross hotel.

Building stone of good quality is obtained from various parts of the magnesian limestone district, differing in composition as regards the relative proportions of lime and magnesia.

The nearer the composition of the stone resembles that of true dolomite, and the more crystalline is its character, the better building stone is it likely to prove. The Bolsover stone, originally selected for the Palace at Westminster, contained fifty-one per cent of carbonate of lime, and forty per cent of carbonate of magnesia.

It would be useless to attempt to give anything like a detailed account of the vast number of very excellent building stones with which this country abounds, but I shall endeavor to make a selection of such as may best serve to illustrate the chief differences that exist between them, both as regards their chemical composition and physical structures. In examining a specimen of stone, our first inquiry would naturally be directed towards ascertaining its chemical composition, so far, at all events, as would be requisite for deciding upon the class to which it belongs, whether it is a sandstone or a limestone, or partakes of the character of both. Having determined this point, we should ascertain the condition in which its constituents exist, whether crystalline or otherwise, and proceed to a careful examination of its physical properties generally, such as its hardness, density and strength, and also its porosity, as shown by the amount of water it will absorb. It is upon these physical properties that the value of a stone mainly depends, for we find sandstones containing very nearly the same amounts of silica, or limestones containing the same proportions of carbonate of lime, and yet differing widely from each other in their relative value for building purposes, their durability or otherwise being mainly dependent upon their physical structure.

In conducting an investigation of this nature, the examination of sections of stone under a microscope will afford much useful and valuable information as to the nature and character of the minerals of which it is composed. As regards the more practical tests, it is very desirable, if not absolutely essential, that they should be conducted in as uniform a manner as possible, otherwise the results obtained are no longer capable of being compared with each other, and consequently lose much of their value.

The capability of stone to resist a crushing force is usually stated in the circulars issued by quarry owners, as being represented by the number of pounds per square inch, or tons per square foot, which it is capable of bearing without breaking; but these results are not strictly comparable with each other unless the tests have been conducted in the same manner, and with blocks of the same size. The method most generally adopted, is to subject six-inch cubes, bedded between pieces of pine three-eighths of an inch in thickness, to hydraulic pressure, noting the amount of force obtained when the first crack makes its appearance, and also when the crushing takes place. Another useful test of the strength of stone is to expose repeatedly, small slabs saturated with water, and enclosed in a metal case, to a freezing temperature.

The density may be taken approximately by simply weighing six-inch or twelve-inch cubes, if carefully cut; but for more accurate determinations, the usual manner of taking the specific gravity of solids by ascertaining the difference in weight in air and when immersed in water, may be resorted to. For this purpose, small one-inch or one-and-one-half-inch cubes are the most convenient sizes. The specimens, previously dried and weighed, should be rendered impervious to water by immersion for an instant in melted paraffin, or by coating them with a thick solution of shellac in methylated spirit, and again weighed. The difference between the specific gravity of paraffin or shellac, and that of water, is not sufficient to give rise to any serious amount of error, whilst the necessary correction for this difference can be easily calculated for, if greater accuracy be desired.

In drying specimens of stone, care should be taken to avoid too high a temperature; if time allows, it is preferable to do so by simply exposing them to the air of a warm room, and under no circumstances should the temperature be allowed to exceed two hundred and twelve degrees Fahrenheit. When dried rapidly at this temperature, the specimens should be allowed to remain for an hour after removal from the drying chamber, in order that they may cool down and take up their hydroscopic moisture before weighing. The variations that exist as regards density in different kinds of stone are considerable. The lighter descriptions, such as Caen and Bath stone, weigh from about one hundred and sixteen pounds to one hundred and twenty-three pounds per cubic foot, whilst the heaviest, such as granites and marbles, will weigh from one hundred and sixty-five pounds to one hundred and seventy-five pounds.

The amount of water absorbed by stone is sometimes determined by exposing the dry specimen to an atmosphere saturated with moisture for forty-eight hours, a method which gives very good results when making a careful comparative examination of two different specimens of stone; but a more rapid and sufficiently accurate method for most practical purposes is to immerse a slab about three inches square and half-an-inch in thickness in water, until no further bubbles of air make their appearance, when it is taken out; the water on the surface is removed with a piece of bibulous paper, and the increase in weight ascertained. The less durable kinds of stone, such as Caen stone and many descriptions of Bath stone, absorb as a rule more water than Portland, Ancaster, or Doulting, whilst granite and marble may be regarded as non-absorbent. In a report to a Commission appointed at Munich on the subject of stone, the following tests were proposed for adoption:

1. Determination of the salts soluble in water.
2. Determination of its porosity by ascertaining the amount of water taken up by capillary absorption during twenty-four hours, as well as that absorbed by total immersion.
3. Exposure of a sample saturated with water and enclosed in a metal case, to a temperature of from five degrees to fourteen degrees Fahrenheit, such exposure to be repeated ten times.

In carrying out experiments with stone, it is always desirable to have a specimen of stone of known quality and belonging to the same class as those under examination, included in the investigation, since it is difficult to ensure the conditions under which experiments are made being precisely the same under all circumstances.

However much care may be taken in the examination of specimens, it must never be forgotten that it is absolutely necessary, before deciding on the relative merits of different kinds of stone as to their suitability or otherwise for any special purpose, that the quarries should be visited, and the several beds carefully inspected, for in almost every quarry, whatever the description of stone may be, a very material difference will be found to exist in the quality of the stone yielded by its several beds.

Samples of stone from the same quarry, and sometimes even from the same bed, in which no practical difference can be detected by chemical analysis, will not unfrequently be found to exhibit considerable variations in physical structure, a knowledge of which can only be obtained by actual inspection of the stone *in situ*. No opportunity should be lost of obtaining information as to the condition of buildings in which the stone has been employed, and all quarrying operations should be conducted under efficient superintendence, in order that no stone of inferior quality should be permitted to leave the quarry.

Time should be allowed for what is termed the "quarry water" to dry out, by which the surface of the stone is hardened, and the tendency of pieces to split off, so frequently exhibited by newly-quarried stone, especially in frosty weather, is decreased. The hardening which takes place during the process of slow drying, by exposure to the air, is probably owing to the deposition within the pores of the stone of mineral matter previously held in solution by

the quarry water. This beneficial result is not obtained when any process of artificial drying is adopted, which is too rapid to allow the matter deposited to assume such a crystalline structure as results from the slow drying effected by simply exposing it to air. Moreover, such artificial drying may have an injurious effect, on account of its giving rise to unequal expansion and contraction of the surface of the stone as compared with the moist interior.

[To be continued.]

BOOKS AND PAPERS.

MR. PATER'S new volume, like his "*Marius the Epicurean*," will only please those persons who, as he himself says, can enter into the seriousness of life. They will find "*Imaginary Portraits*"[1] in its way as charming as "*Marius*," but it is, if possible, more sad. Mr. Pater has evidently found the world what it is to the generality of people unless they shut the eyes and ears of their understanding, an eminently sad place. But he might sometimes give us less dismal terminations. True, life ends in the change to all of us which we familiarly call death, and Mr. Pater believes fully in the sacrifice of one person for another — pure self-sacrifice. This, in these days of the selfish pursuit of ease and comfort, is most refreshing, but the ends of his four imaginary persons are almost too miserable. One dies of consumption; another is hunted to death by a mob, and torn bit from bit; the third is drowned in an inundation after having saved the life of an infant; and the fourth is crushed to death by a victorious army. But it is only with the first of these personages that we have to do, "a prince of court painters," Antoine Watteau.

Whether Mr. Pater has really found "an old French journal" giving details of Watteau's life, we know not, but it purports to be the diary of a girl who evidently loved the painter, and whose young brother, Jean Baptiste, becomes Watteau's pupil. This is no other than Jean Baptiste Pater, but whether an ancestor of the author's, or whether the sameness of name gave the idea for the sketch, we are left in ignorance. At any rate, the journal has all the local coloring which makes it appear a reality, and the various incidents in Watteau's commonplace life are welded together with much feeling. Mr. Pater has only one fault — he is too often obscure; his sentences are long, and the sense is often involved. This was the great fault of "*Marius*," and prevented many persons from reading a book which would have charmed them and comforted them, and the perusal of which would have been to their profit. "*Imaginary Portraits*" has fewer of these defects, but, as an example, on page 2 we have a sentence of fifteen lines out of twenty-five.

Watteau was the son of a stone-mason, and being a painter born and "genius," besides the godson of the elder Pater, who was a sculptor, he seems to have been helped on and encouraged by the older man. Little sympathy did he get as a boy from his father, although "he was not ill-to-do," for he had built him a new house in their native town, Valenciennes. In this old place he makes much progress, but the narrator's father thinks he has "too little self-approval of his work which he does so easily." All his days he seems to have been dissatisfied with his work and with his life. Was this due to his large, unquiet eyes, or were they agents of the unquiet brain? He "habitually fell out with himself and what he produced." At last his restlessness cannot be kept within bounds, and he goes to Paris, a result brought about by his girl friend speaking to a scene-painter from the great city, unknown, of course, to Watteau. And then there is a giving of farewell presents, the girl presenting him "with a silken purse she had long embroidered for another."

At Paris, Watteau became one of Metayer's assistants, and distinguished himself as able to paint any part of a subject, whereas, the other apprentices could only do a "*coiffure*, or a robe, or a hand." The pictures so concocted were sold on the Pont Nôtre-Dame at a low price, and for his work Watteau received three livres a day, but he soon gave this up, and took to decorative work, and, oddly enough, battle pictures; and then he returns home and lodges with the Paters, and fascinates Jean Baptiste as well as his sister with his art and his elegant manners and "his air of seemly thought." He takes the adornments of life "as if he had been born to them," and so Jean Baptiste goes back to Paris with his friend, and no longer "dances a minuet upon the grass with his youngest sister to the tune of a strolling lutanist." Is not this quite a Pater subject?

Later on we hear of Watteau competing for the *Prix de Rome*, but only gaining the second place, which prevented him from going to Rome. And then the girl remarks: "Could I save enough by careful economies for that purpose? It might be conveyed to him in some indirect way that would not offend." How charming this is! In 1712, the girl writes that they read in the *Gazette* that "Watteau had been elected to the Academy of Painting under the new title of *Peintre des Fêtes Galantes*, and had been made also *Peintre du Roi*. My brother, Jean Baptiste, ran to tell the news to old Jean Philippe d'Michelle Watteau." Then the painter became acquainted with the connoisseurs M. de Crozat, M. de Julienne, the abbé de la Roque, Count de Caylus, and M. Gersaint, who all of them wanted to lodge him in their fine hôtels. And thus the journal describes Watteau's new manner of decorating houses: "Something of lightness and coquetry, at variance, methinks, with his own singular gravity and even sadness of mein and mind, more answerable to the stately apparelling of the age of Henry the Fourth or of Lewis the Thirteenth, in these old, sombre Spanish houses of ours." And then when her brother goes to Paris, she cries from her inmost soul: "With how small a part of my whole life shall I be really living at Valenciennes." In March, 1714, she relates that she went to early mass in the church of St. Vaart, where "our people lie under one of the great marble slabs before the *jubé*," and where the settle which runs around the wide nave is her father's work. Here she once again meets Antoine, who has come to stay with the old people, and uses his holiday in painting the Pater's *salon* in the new *Watteau* style. "The rough plaster we used to cover, as well as might be, with morsels of old-figured arras-work, is replaced by dainty panelling of wood, with mimic columns, and a quite aerial scrollwork, around sunken spaces of a pale-rose stuff, and certain oval openings — two over the doors, opening on each side of the great couch which faces the windows, one over the chimney-piece, and one above the buffet which forms its *vis-à-vis* — four spaces in all, to be filled by and by with 'fantasies' of the Four Seasons, painted by his own hand. He will send us from Paris arm-chairs of a new pattern he has devised, suitably covered, and a painted *clavecin*. . . . He has completed the ovals — the Four Seasons. Oh! the summerlike grace, the freedom and softness of the 'Summer' — a hay-field such as we visited to-day, but boundless, and with touches of level Italian architecture in the hot, white, elusive distance, and wreaths of flowers, fairy hay-racks and the like, suspended from tree to tree, with that wonderful lightness which is one of the charms of his work. . . . I can understand through this, at last, what it is he enjoys, what he selects by preference from all that various world we pass our lives in. I am struck by the purity of the room he has refashioned for us — a sort of *moral* purity, yet in the *forms* and *colors* of things. Is the actual life of Paris, to which he will soon return, equally pure that it relishes this kind of thing so strongly?" Poor innocent Valenciennaise!

A few months later she writes — or rather her descendant, Mr. Walter Pater does, for the sentence is in his most poetic vein — "the sullenness of a long, wet day is yielding just now to an outburst of watery sunset, which strikes from the far horizon of this quiet world of ours, over fields and willow-woods, upon the shifty weather-vanes and long-pointed windows of the tower on the square — from which the *Angelus* is sounding — with a momentary promise of a fine night." Of her brother she says: "There are points in his painting (I apprehend this through his own persistently modest observations), at which he works out his purpose more excellently than Watteau, of whom he has trusted himself to speak at last, with a wonderful self-effacement, pointing out in each of those pictures, for the rest so just and true, how Antony would have managed this or that, and with what an easy superiority have done the thing better — done the impossible." Pater was a far more patient and hard worker than Watteau, painting from dawn to sunset and drawing afterwards by lamplight, but he was not so fine a colorist, and his work has the appearance of being more labored. Like his descendant, he is wanting in "style"; indeed, it is our author's only fault. Is it the remains of the somewhat clumsy and heavy disposition of the old Flemings?

Space will not permit me to quote all the paragraphs I have marked in the book, but in all Mr. Pater's criticisms of Watteau, Pater, Dow, and others who pass before the reader's eyes, he is more or less correct. That Watteau, like our own Reynolds and Wilkie, was a careless painter as regards pigments and combinations of colors is only too patent by his works which survive, but that his aspirations were much above those of his contemporaries is doubtful. Perhaps the following may be Watteau as seen through the spectacles of the girl who loved him: "Those trifling and pretty graces, the *insignia* to him of that nobler world of aspiration and idea, even now that he is aware, as I conceive, of their true littleness, bring back to him, by the power of association, all the old magical exhilaration of his dream — his dream of a better world than the real one." Perhaps, like others, he drifted into painting court ladies and gentlemen against his better self, and, to make them bearable, he put them into such surroundings as the "L'embarquement pour l'ile de Cythère." But we cannot help wishing that his art had been more like his disposition — serious. That his pictures are charming idyls every one must admit, but one cannot help feeling that his people are clothed in the shams of the period, and full of the affectation of hilarity and the sylvan virtues. If only his splendid coloring, his nervous drawing, his grace and elegance could have been expended upon something better! For fans and *clavecins* and other small decorative work, his art is perfect, but I fancy most persons who feel the seriousness of life would get weary of sitting an entire day in a room panelled with *fêtes champêtres*. There is nothing so irritating as being told to be cheerful when one is melancholy, and nothing so wearisome, when the heart is sad, as to sit looking at others dancing.

Watteau died of consumption at thirty-seven years of age, having been more or less a victim of the disease all his life. Here are his love's reflections upon the end. "I think his days, too, would have been really happier had he remained obscure at Valenciennes" (and married me, one reads between the lines). "Our incomparable Watteau is no more! . . . Antony Watteau departed suddenly in

[1] "*Imaginary Portraits*," by Walter Pater, M.A. Macmillan Co.: London and New York, 1887.

the arms of M. Gersaint on one of the late hot days of July. At the last moment he had been at work upon a crucifix for the good *curé* of Nogent, liking little the very rude one he possessed. He died with all the sentiments of religion. He has been a sick man all his life. He was always a seeker after something in the world that is there in no satisfying measure, or not at all." S. BEALE.

COMMUNICATIONS

THE FRENCH AND HOUDON'S "WASHINGTON."

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In a recent number of the weekly supplement to the *Gazette des Beaux-Arts* I find the following article on Houdon's statue of Washington which I venture to translate in full. It is signed "L. G.," and may, therefore, be attributed without breach of etiquette to M. Louis Gonse, the editor-in-chief of the publication.

"M. Félix Régamey has just published in the literary supplement of the *Figaro* a most interesting article on one of the least well known yet most important works of our great sculptor Houdon. It refers to the full-length statue of Washington which Houdon executed in 1788 in answer to the wish of the General Assembly of Virginia, and which was placed, in 1796, in the Capitol at Richmond, where it still stands to-day, almost forgotten by the American people and certainly quite ignored by Frenchmen. M. Régamey happened to see it — it may almost be said to discover it — in 1881, and addressed a report to M. Antonin Proust, the then Minister of Fine Arts, suggesting that a plaster cast should be taken from it for the Trocadéro Museum. Now, we know that it is proposed to open a sub-cription in several of the large cities of the United States for the purpose of offering to France a statue of Washington as a return gift of gratitude for the Liberty Enlightening the World. The idea is to appeal for the purpose to one of the best sculptors of America. But M. Régamey, while appreciating the excellence of this intention, asks, with infinitely good reason, whether the proceeds of the subscription might not be used in a way which would respond much better to the intentions of the American nation and to the desires of France herself.

"After making his report to M. Proust, he discovered that there still exists in the possession of the family of the caster, Hubard, an original proof in bronze (of the Houdon statue) of the same size as the marble. This replica would be sold for the price of 40,000 francs. 'Why,' asks M. Régamey, 'should one not suggest to the Government of the United States the idea of applying the proceeds of the subscription to the purchase of this bronze of Houdon's Washington, that it might be offered to the Louvre Museum in the stead of a modern statue of quite uncertain (*aléatoire*) artistic value, which would simply be destined to ornament a Parisian square?'

"We hope with all our heart that M. Félix Régamey's idea may make its way, and that his appeal may be listened to on the other side of the Atlantic. If the American people wish to thank us for our gift by such an attention, they could find none more delicate or better calculated to touch our feelings."

May I make myself the mouthpiece of what I think will be the sentiment of all your readers, and say to M. Gonse that our feelings are touched by his suggestion and that we appreciate to the full the delicate manner of its expression? The French, we know, are graceful people and a courteous, how, then, can we suspect a Frenchman of bad manners? Our own cruder code is different. Here it is a precept of the nursery that a gift shall not be criticized in the ears of the giver, but perhaps in France it may be, and perhaps the possible reception of a gift may be publicly discussed. If a French child were to say: Is not this a delightful object? We made it ourselves and would like very much to have it and might buy it cheaply if we would, but we hear that Cousin Jonathan means to make us a present (as he very well might) in return for that nice one we gave him last Chr stmas. Why should we not suggest to him to give us this instead of that similar object he means to manufacture himself, and which will be of very uncertain value? If a French child were to say this and take measures for bringing its words to its cousin's ears, perhaps he would not be scolded for bad manners and greediness, but praised for his good taste in the matter of gifts and for his courtesy in trying to preserve his friend from the disgrace of making a present which would not really represent his intentions or (delicious thought!) thoroughly meet the desires of the recipient.

In truth, M. Gonse's little article seems to me one of the most amusing productions I ever read. Its *naïf* want of tact is as superb as though no such thing as a sense of humor existed in the world, and is displayed not more in the general idea that such a hint should be given than in the manner of its giving. What a delightful way it is of persuading us to donate the Houdon statue, that calm assuming that the value of an American statue cannot be counted upon! How characteristically French is the ignorance of conditions in another country shown by the thought that the Government will have the disposal of funds collected by popular subscription! And how curious the assumption that such subscriptions will be raised seems to us who know the history of the Bartholdi statue in this country! Perhaps some one has really proposed to set them on foot, though I had never heard of the fact till M. Gonse declared it. But it seems a singular thought that money may be obtained to make a thank-offering for a gift with regard to which it was difficult to get enough money to make its mere acceptance possible. The story of the building of the pedestal is not an encouraging sign that France will soon get from us a Washington in just the way M. Gonse seems to expect. Now that we have it we are to a certain degree grateful for the Liberty. It is a fine piece of suburban landscape decoration, though in no sense a great work of art; and its giving was doubtless in large part inspired by very friendly feelings though an unfortunate echo of *réclame* accompanies it. Have we not even heard that New York and the title "Liberty" were but second thoughts — that Suez and some such name as "Commerce," or "*La France Protectrice*," were at first associated with the artist's conception? But to speak thus is to be exasperated by M. Gonse's example into the very error against which I have protested. Indeed, it is not good manners to look a gift-horse in the mouth, even after we have a right to declare that it *is* a gift-horse.

The most exasperating thought of all, however, is that M. Régamey's idea has, intrinsically, much to recommend it. There are many reasons why Americans should wish in one manner or another to express their gratitude to France. The fact that France gave us the "Liberty" is the very least of them. The strongest are those memories of courteous welcome, helpful example and invaluable instruction which fill the minds of hundreds of American artists who have studied in Paris, and of thousands of observers who prize their subsequent work at home. Here is a vast debt which we very certainly owe. We can never hope to pay it, but it would be both righteous and graceful to recognize it as frankly and as clearly as possible. If our Government would remove the tariff on foreign works of art that, of course, would be the best possible recognition. But, until this can be brought about, the public, or certain sections of the public, ought to try to do what it can. Our architects have set the example by founding an annual *Prix de Reconnaissance*, open to students of French birth only, in their own sections of the École des Beaux-Arts. It would have been an appropriate and graceful act could our sculptors, for example, have learned in some other way of the existence of the Houdon bronze, and have bought it for the school. But M. Régamey, assisted by M. Gonse, has made such an act almost impossible. For Americans to present it in answer to the suggestion of Frenchmen would seem as stupid and perfunctory, as it seemed naïvely and amusingly tactless for Frenchmen to suggest that it might well be given. M. G. VAN RENSSELAER.

CEMENT-STUCCO WORK.

NEW YORK.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your issue of August 27, Mr. A. B. Jennings requests some suggestion for producing an even color on a cement-stucco brick wall, and he is afraid of using paint, because the cement would eat through it. Permit me to recommend your correspondent the use of English "duresco," which I have employed and had under my observation for several years. Cements and lime-mortars do not eat through it, and it is a perfect anti-damp preparation. It can be had brick-red or white, which can be stained to any color, and the shade remains uniform and does not scale or blister.

Yours truly, HOWARD FLEMING.

WASHINGTON, D. C., August 29, 1887.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Your last issue contains a communication from Mr. A. B. Jennings asking what treatment to adopt with a wall stuccoed in cement unsatisfactory in color. I would recommend an application of a strong solution of sulphuric acid to counteract the causticity of the cement, to be afterwards washed with clear water. After drying, the stucco can be painted in oil or distemper in any desired color. Respectfully,

O. VON NERTA.

NOTES AND CLIPPINGS

DESTRUCTION OF BUILDING-STONES. — Mr. Gobin, a French government engineer at Lyons, addresses the following letter to *La Nature* on one of the causes of the decay of building-stones:

"I think I can point out one of the causes of the destruction [of stones] which, as far as I know, has not been noticed, and which acts upon the hardest and most resistant materials, such as granite. This cause is the abrupt expansion produced by the action of the sun when the temperature of the air is very low and the sky is clear. The following are the facts which I have observed and which justify this opinion:

"At Saint-Pal-de-Mons (Haute-Loire) a granite cross is standing in a public square opposite a church, and the inscription upon it shows that it was set up in 1670. The upright portion of the cross is cylindrical and exhibits a curious phenomenon. The superficial layer of the stone has detached itself circularly from the central part to a depth of about half an inch. A portion of this layer has fallen from half the circumference of the upright, and what remains forms a sort of half-sheath,

very distinct from the rest of the mass, so that the whole has the aspect of a fossil-tree that has preserved half of its petrified bark. As the portion of the envelope that has fallen is found at the south side, we cannot see in this phenomenon an effect of frost solely, but must recognize the fact that it is a consequence of the successive expansions and contractions that have been renewed thousands of times since the cross has been exposed to the sun's rays. I may add that the climate of the country is very cold, on account of the great altitude, and that the air is pure and fogless. The action of the sun in winter, then, must produce great differences in temperature.

"A similar, but less marked, phenomenon is observed upon a granite cross in the village of Joux, near Tarare (Rhone).

"Finally, upon the first granite column on the right side of the chancel of the church of Ainay, at Lyons, is to be seen a superficial slab that has detached itself from the mass, and very likely under similar circumstances These columns, in fact, came from a Roman temple, and we may conclude from the fact noted above that the one mentioned stood in the interior of the temple at the south side, or else that in the ruins of the temple it was exposed for centuries to the action of the sun."

Salt.—The fact is probably not generally known that the salt mountains of Nevada, the salt island in Louisiana, as well as various other deposits of chloride of sodium in different parts of the world are almost absolutely pure chloride of sodium. It appears that of 22.28 per cent of salts found in Great Salt Lake, 20.19 per cent is pure chloride of sodium, and yet many of the streams running into the lake contain vastly larger quantities of other salts, some of the water being so heavily charged with nitrates and sulphates of soda and potash as to be unfit for animals to drink. In the lake all the potash salts have disappeared. In the ocean, too, the salts named must, from time to time, have found their way into its waters in immense quantities, and, in respect to what has become of them, it has been suggested that the chloride of sodium may have possessed and exercised the power of separating them and driving them down into the earth beneath. In instances where the water is nearly saturated, as in the Dead Sea and Salt Lake, it might be a question of solubility — it might be that the chloride of sodium was the most soluble, and that in this way the others were precipitated. In the ocean, however, seldom as much as four per cent of the mass is solid material, and the point of saturation for any of the salts is not approached, or, if precipitated from saturation, they would lie on the bottom as crystals; but the fact is, they have disappeared into the earth at the bottom of the sea. The probability is considered to be that by settling down into the mass of earth beneath the sea, they have contributed to increase its specific gravity, and thus enabled it to overbalance the weight of the dry land, and in this way aided in causing the seas to occupy a lower level than the surrounding land.— *Boston Transcript.*

Terra-cotta Tablets from Babylon. — A collection of Babylonian antiquities of great interest is at the present time in the hands of a private collector in this country. The collection consists of a series of about 300 inscribed terra-cotta tablets relating to the revenues and tithes of one of the most ancient of the Babylonian temples. In 1880, Mr. Hormuzd Rassam, when engaged on the works of exploration in Babylonia on behalf of the Trustees of the British Museum, discovered about thirty miles from Bagdad the site of the ancient city of Sippara, one of the chief centres of the religious life of Chaldea, in which was a great temple dedicated to the Sun God. On the return of Mr. Rassam to England native overseers were retained on the site for a short time, but were last year removed. No sooner were these men withdrawn than Arab antiquity hunters from Bagdad commenced their irregular diggings on the site, and the collection which has just reached this country was thus obtained. The majority of the tablets relate to the collection of the revenues of the temple, which were derived from tithes and dues imposed on corn and dates, as well as contributions from pious donors. The new collection of tablets affords very clear indications of the wealth of the land of Chaldea in the seventh and sixth centuries before the Christian era. Thus from one tablet we learn that 4,600 sheep were given to the temple as sheep-dues in one year, the owners being allowed to redeem them on payment of certain sums. In the reign of Darius we have the entry of fifty-four shekels of gold — a metal rarely mentioned in these tablets. One of the most interesting features of the tablets is the great care with which the accounts are kept. The names of the payers are entered in full, and sometimes the name of the father and the trade are given. The amount is entered in ruled column, and separate payments in other columns the total being given at the foot, and the whole sometimes countersigned by witnesses. Independent of their value as indicating the flourishing condition of the land of Chaldea and the richness of the temples, some of these tablets are of great historical value as connecting links in the chain of documents on which Babylonian and Assyrian chronology are based. Every one of them is dated in month, day, and regnal year of the King's reign when the transaction took place, and are, therefore, a most valuable aid to the construction of the chronology of the period. — *London Times.*

The Electric Light in Vienna Opera House. — The Vienna Opera House has now been illuminated by electric light, which has given great satisfaction to the audiences. The system, which is by accumulators, is to be applied to all the theatres and public buildings in the city. The current is supplied from a generating station in the Schenkenstrasse, a central point of the city, and in the building formerly occupied by the British Embassy. Machinery has been laid down here for the supply of 20,000 lamps. The boilers, engines and dynamos were supplied by Messrs. Crompton & Co., of Chelmsford, who sublet the boiler contract to the Wittkowitz Iron Company. Willans' high-speed compound engines are adopted, and Crompton dynamos. Four cables are laid underground to the Opera House, a distance of about three-quarters of a mile. They are connected to the accumulators by four switches. Other wires lead to a switchboard under the stage for the supply of the lamps. Every circuit has a tell-tale or pilot lamp. The original gas fittings of the building have been utilized as far as possible. The accumulators were supplied by the Electrical Power Storage Company, of Great Winchester Street, London. A novelty has been introduced by M. Monnier for the graduation of the stage lights in the form of helical resistances of the platinoid wire introduced to the notice of the electrical world by Mr. Bottomley and Sir William Thomson. These resistances are steeped in oil to keep them cool, the oil being surrounded by a water-jacket. We may add that the lighting of the Opera House was instigated by the Emperor.— *Engineering.*

The Sukkur Bridge. — The Sukkur Bridge has just been completed at the works of Messrs. Westwood, Baillie & Co., London Yard Poplar. The bridge, which is on the cantilever principle, is to be constructed over the Kohri Pass of the Indus, at Sukkur, on the line of railway from Kurrachee and Attock. A noticeable feature about the work is the erection of probably one of the finest pieces of scaffolding which has ever been built, and which has been a conspicuous object on the banks of the Thames at Poplar and for miles round. It is 400 feet long and 120 feet wide, and 180 feet high, with about 2,600 loads of timber, which, if laid out, would measure twenty-four lineal miles, the weight of the bolts, nails, and other ironwork being about forty tons. The contract has taken about two years to complete, the bridge having to be temporarily erected at the works previous to being sent to India. — *Timber.*

Statesmen for Gargoyles. — Some months ago the parish church of St. Giles's, Camberwell, was restored, and a buttress standing at the western corner was ornamented with five gargoyles. These figureheads represent five statesmen — Lord Salisbury, Lord Randolph Churchill, Mr. Gladstone, Mr. Bright and Mr. Chamberlain. This is evidently a new departure in ecclesiastical architecture, for hitherto gargoyles have been representations of grinning devils. The Tories are more severely treated than the Liberals, both Lord Salisbury and Lord Randolph Churchill being a sight for men and angels. — *London Truth.*

TRADE SURVEYS

There seems to be a unanimity of opinion among men representing great manufacturing, banking, railroad and commercial interests that all the conditions are favorable for a continuation of the phenomenal business activity that has characterized the year 1887 thus far. Industrial enterprises are projected with as much faith; capital is expended lavishly; new railroad work is projected on a large scale. Engineering enterprises are looming up. Both foreign and domestic capital is seeking opportunities. Nearly all investments are remunerative. Dividends of all kinds of corporations are regularly paid. The volume of work is increasing. Various trade and manufacturing interests assert that this summer's business has exceeded all previous records. Production is prosecuted on a gigantic scale. The great factors, such as railroad-building machinery-construction and house-building are giving strength to the markets. All statistical reports are encouraging, that of the iron trade is especially so. With a production of ten million tons of iron and steel last year, and an importation of 1,100,000 tons of foreign material, the country is practically bare of iron and steel supplies Over one hundred large iron and steel making establishments from blast furnaces and rolling mills down are either under construction or are projected. Within six months works have been projected for the construction of locomotives which will increase the capacity ten to fifteen per cent. New structural iron mills are under way. Plate mills are sold ahead. Bar-mills are full of orders. Nail-makers east and west are combining and several factories are putting in machinery to manufacture wire nails instead of cut nails, because of their greater service. Within two weeks some of the largest machinery and boiler contracts ever placed have been disposed of and New England makers have taken the cream. Western machinery makers are filling up faster than was anticipated. The demand from small shops, factories and foundries is heavy. The hardware manufacturies have made a better September start than ever before. The nail-makers are holding a convention this week to control competition A score of trade combinations are under way, all aiming at a greater control over production and distribution. The tool and small machinery makers, stove-makers and others who supply farm machinery have started in with a good stock of fall and winter orders. The latest advices from electricians and electrical-supply manufacturers and dealers is to the effect that the facilities of this new industry will be fully taxed. The orders are crowding in from hundreds of cities and towns. Manufacturers of belting report business very active. Manufacturers of leather have pushed production rapidly and prices are only barely remunerative. Producers of textile goods have a good outlook and a great many mills are increasing their facilities. The lumber interests are struggling for better prices and complain generally of a scarcity of cars. The heavy railway traffic is stimulating a heavy demand for rolling stock. All kinds of lumber is moving quickly and a higher range of prices is hoped for. An increasing demand for lumber is observed throughout the West. There is no observable decline in building activity in the larger and smaller cities The reports show that the building season is an extremely active one and that the demand for house and shop room and for buildings of all kinds is stimulating enterprise. The builders have reason to rejoice over the success enjoyed. Material is steady and in abundant supply. Labor has consented to let matters stand for the present though in some channels there are probabilities of serious trouble. The coal trade is active and production is six million tons ahead of last year. Natural gas production is increasing and manufacturing demands are stimulating the construction of new lines. Railroad companies have been again considering the question of using petroleum for fuel, but so far with unfavorable results. Architects report favorable indications for the future. Large buildings for office and business purposes are wanted and work will begin on many new buildings this winter. The best authorities among architects anticipate a good year in 1888. House building will not fall off from present indications. The financial outlook is favorable in spite of all appearances to the contrary. The credit of the business interests was never better and all influences at work are contributing to a strengthening of the financial situation.